

EXPERIMENT STATION RECORD.

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EXPERIMENT STATION RECORD.

VOL. XXVII.

NOVEMBER, 1912.

No. 7.

The 1912 convention of the Association of American Agricultural Colleges and Experiment Stations will long be remembered as one of the most interesting and inspiring annual gatherings of the association since its organization twenty-six years ago. Although the anniversary features stood out prominently, and there was a tracing of progress and a setting forth of what the establishment of these institutions has meant, the present-day problems did not lack for attention, and their consideration was characterized by a clearness of vision and a maturity of thought which showed the extent to which opinion has been crystallized on many fundamental lines of policy. A brief account of the convention will be given in a subsequent issue.

The three anniversaries observed this year commemorate the beginning of opportunity for agriculture in this country. Hence their special significance. It was in 1862, a half century ago, that the Morrill Act was passed donating public lands for industrial education, which marked the birth of the agricultural college in America; and it was in the same year that the National Department of Agriculture was founded at Washington. It was in 1887, a quarter century back, that the policy of federal aid for agricultural experimentation throughout the country was established. These three events are the most important from the standpoint of agriculture which this or any country has known. Out of them has grown the largest and most influential movement in education, the most highly developed department of agriculture, and the most comprehensive and efficient system of experiment stations to be found in any country.

Agriculture waited many centuries for such a recognition. It was a trade merely, conducted on the basis of experience and personal judgment, with only a hinted basis in science. It was unformulated as a teaching subject, the trade school being the only ideal in agricultural instruction, and there had been provided for it but slight means of acquiring knowledge except through empirical experience. For the most part it was guided by tradition, and it embraced an element of superstition, which ascribed important considerations to

the phases of the moon and the movement of other heavenly bodies. The idea that it involved much more than skill and intuition and brawn, or was teachable except as a practical art, or that experience and tradition could be extended and interpreted in the light of science, was new and restricted. It was only the farseeing who realized these possibilities. The farmers who had received a college education were not more successful than those who had not, for they found their education bore no relation to their business and they must go to school to the successful men of their neighborhood. Except for the broader vision it gave them, the influence of their education in advancing agriculture was negligible.

We have now become so accustomed to these three agencies for agricultural advancement, it would seem that their significance and great importance should always have been recognized. The struggle and opposition of a few years ago is lost sight of, and it is difficult to realize what an innovation their establishment marked. The review of the conditions under which these movements began, the history of their progress, and the measuring of their influence and position formed, therefore, matters of rare interest at the recent convention.

Such reviews were ably presented by Dr. W. O. Thompson for the land-grant colleges, Dr. A. C. True for the Federal Department of Agriculture, and Dr. H. C. White for the experiment stations. These papers, together with the presidential address of Dr. W. E. Stone and a paper by Dean Davenport on the American agricultural college, constituted the special anniversary features of the convention. By vote of the association these papers are to be printed separately from the proceedings for more extended distribution and use. Those relating to the land-grant colleges will here be considered, reserving for a future issue the anniversary of agricultural experimentation as embodied in the National Department of Agriculture and the American system of experiment stations.

In the presidential address of Dr. Stone and the historical paper of Dean Davenport, the history of these colleges was drawn upon to show something of the vicissitudes they have passed through, the dangers which still confront them, and the position they have attained in the field of education.

Dean Davenport characterized the history of the agricultural college as forty years of apparent failure and a dozen years of dazzling success. From the fact that the fundamental ideas underlying them were new and radical, they had to meet the conservatism of the older and well established institutions. In their early history they experienced an attitude of indifference, mistrust, and general lack of confidence. "Farmers did not believe in their principles. Edu-

others regarded them as outside the sphere of educational recognition, and these attitudes were reflected by the general public." Further obstacles in the pioneer years were the undeveloped condition of science, the lack of a body of teachable knowledge, and the lack of trained teachers for industrial education. Even the experiment stations, which came after the barriers of prejudice had been partially broken down, were for a time received with scant confidence by either the public or by scientific men.

A large measure of credit was given the separate agricultural colleges for the success which has attended agricultural education in later years. These colleges for thirty or forty years withstood the brunt of the attack on this new education, worked out the ideals of the founders, and gradually developed the means and the system for teaching agriculture and secured recognition for it.

In the recent development of these institutions the constituency of the college has come to be the whole State, with provision for extension teaching and for agricultural research and demonstration. Their students have increased a thousand per cent in the last ten years, and at the same time the colleges have greatly advanced their standards. It was stated that in the case of the agricultural colleges connected with universities, fifty-five per cent of the graduates return to the land, and ninety-five per cent engage in some agricultural pursuit.

Now that the land-grant colleges have demonstrated their claim to an honorable place in the educational field, and have acquired prestige and public confidence, new opposition and jealousies have developed within the States as to the field they are occupying, the support to be given them, and other matters, giving rise to controversies which have threatened to disrupt them in some cases. This conflict between competing institutions Dr. Stone regarded as a matter of serious concern, calling for wise and liberal action. "In States where the land-grant college and state university are separated, no time should be lost by their authorities in arriving at an understanding as to the respective fields they are to occupy, always with reference to public welfare. Duplication of effort should be avoided for the sake of economy as well as harmony, and then good faith should be kept. The ideal adjustment between two such institutions is that which secures to the State, by coordination of both, the full range of instruction otherwise given in a single state university, without unnecessary duplication."

Failure to mutually agree upon an adjustment will inevitably bring legislative interference, and the possible clothing of a single board of regents with extraordinary power over the separate institutions. Particularly when the latter method is extended to interference with the internal administration, it was declared to be "destructive of the

spirit, the individuality, and the freedom so necessary to the life and progress of an educational institution."

Dr. Stone also referred to the attempts "to crystallize an interpretation of the Morrill Act to the effect that the land-grant colleges were intended to be of secondary grade—a kind of industrial and trade school; that agricultural instruction is *per se* of this order, and that 'mechanic arts' means trade and vocational training rather than engineering," an assumption which he found to be borne out by neither the law nor the facts.

"All of these difficulties, the struggle for recognition, the opposition of competing institutions, the attempts to segregate the colleges in an inferior class, were but to be expected under the circumstances. They constitute real obstacles and hindrances to progress in many cases. They might have been to a larger degree averted by concerted and positive action of the institutions in formulating their policies with regard to those things and defining their positions in advance."

Dr. Stone also discussed the situation growing out of the present extraordinary general interest in agriculture, which has brought demands on the college the result of which "is likely to be a weakening and letting down of the quality of its instruction and research." Although recognizing this popular awakening as one of the most encouraging movements of the day, he held that extension work demands the wisest guidance in order that it may find its right place and relation in the organization of our institutions. While promoting it and giving it true direction, "we should guard jealously our scientific workers and teachers from the distractions of extension enterprises. It is most certain that the future will demand more and more of our institutions; that much of the present extension work will prove only ephemeral; that the demand will be for more thorough teaching, serious investigations, and for a service which eventually can only be supplied by those who labor in the laboratory and class room rather than on the lecture platform. To prepare for this time we must increase rather than diminish the substantial scientific work in our stations and sound teaching in our colleges, as the reserve from which extension activities must always draw their inspiration and material."

Viewing broadly the work of these land-grant institutions, Dr. Stone declared that their establishment "has brought the application of scientific principles into the commonest occupations, emphasized the democracy of education, established the status of tax-supported institutions of higher learning, and, more than any other cause, contributed to the development of the new education. Now, at the end of fifty years, the land-grant colleges with the experiment stations and

the departments of agricultural extension constitute the most unique, useful, appreciated, and popular group of institutions in the country."

The influence of the Morrill Act upon American higher education, as presented by Dr. W. O. Thompson, was especially interesting because of the review it gave of the early efforts to secure federal aid for industrial education, the ideals developed by these institutions, and the scholarly deductions drawn as to the wider influences these colleges have had on education.

At the present time when these institutions have so abundantly justified themselves and the wisdom of their establishment, it is difficult to realize that the Morrill bill should have been opposed and vetoed on such grounds as its supposed effect on the relation of the federal and state governments, the effect on existing institutions, doubt as to whether it would promote the advancement of agriculture, and the contention that Congress could not appropriate money for education in the States and hence its aid by means of land grant was of doubtful constitutionality. A characteristic feature of the debate of that time, as Dr. Thompson pointed out, was the inconsistency of the position that public land could with propriety be donated for certain types of education (as had already been done in numerous instances), but the doubt as to the propriety of extending this aid to establishing institutions for agricultural education. The land-grant colleges have set at rest this doubt and proved the wisdom of federal aid to education.

As to the origin of the agitation for industrial education and the support it received, Dr. Thompson developed the interesting fact that "in the great agricultural States this movement was born and cherished among the progressive and prosperous farmers in the several communities." He showed this by many references to the reports of agricultural societies and meetings the country over. There was a widespread movement for a practical type of education which should relate more directly to the everyday life of the common people. "This new educational reform sprang not from the educational philosophers or the professional teachers, but from the rank and file of the people themselves." And having developed out of this desire, the land-grant colleges have taken it as their ideal "to teach all knowledge to all men."

This marks a sharp contrast between them and the class of institutions which aim to teach the essentials to prepared men. The needs of the people have been the guiding spirits for the land-grant institutions. The maintenance of conventional standards is not the central idea, but the liberal education of the industrial classes. Such public-supported institution is to be operated "for the good it can

do, for the people it can serve, for the science it can promote, and for the civilization it can advance," a view of democracy in education which is now reflected in many other classes of institutions.

Furthermore, as Dr. Thompson pointed out, the colleges of agriculture and mechanic arts have constituted a great national movement for science in higher education. Their attitude toward science is one of the significant products of the Morrill Act. When science was struggling for recognition in the school programs of the country the land-grant institutions recognized that from the very terms of the law they were to teach the sciences related to agriculture and mechanic arts. While they have emphasized the economic phases of science, obviously applied science must follow pure science, and this has tended to broaden the scope of their field and teachings.

One effect of these colleges on the state universities with which they were associated was that the latter were "forced into a freedom hitherto unknown in higher education. This attitude toward science steadily influenced the attitude toward every other subject properly within the horizon of the university." As a result the state university "found itself free to teach in every field of human inquiry and to investigate any subject yielding knowledge."

The influence of the land-grant colleges upon higher education viewed from their history of fifty years, and the real positions which these institutions have occupied in the educational world, was summed up by Dr. Thompson under the following heads:

- (1) The land-grant colleges have clearly stimulated the interest of the people in higher education. "Apart from the education provided for the students, they have demonstrated their capacity for public service and have carried to the people an uplifting message."

- (2) They have set a precedent for federal aid to education and proved the wisdom of it—of using a portion of the government's increasing revenues "for the purpose of developing a people able to sustain an efficient government."

- (3) They have brought industrial education to its rightful place in the esteem of the American people, and have forced its recognition by all institutions for higher education.

- (4) They have efficiently influenced the practical aims of higher education by insisting upon a larger liberty in the programs of education and in the contents of the course of study.

- (5) They have stimulated investigation and research in many fields. "We can not be blind to the fact that very much of the investigational and research work of American higher education to-day finds inspiration in the achievements of these institutions."

- (6) They have had an influence on the Government itself which has affected the cause of higher education. "The fact that government has become more humane, more beneficent, and almost philan-

tragic in many of its activities, is probably due to the humanizing influence of the educational activities supported and stimulated by the Government."

It is refreshing to have a liberal-minded, appreciative estimate of these institutions, based on an intelligent and intimate study of their activities and influence. It is inspiring, because it shows how large a factor they have actually been in the evolution of industrial education. The other side has often been presented, and, as if misrepresentation had become a habit, credit continues to be denied them, even when they have attained a high degree of success and the results are so much in evidence.

One critic who views the function of the agricultural colleges as that of training farmers, and hence argues for the trade school standard, has recently, in connection with a discussion of the proposed reorganization of a state institution, presented an elaborate argument in favor of an agricultural school pure and simple, maintaining that agricultural education can not be properly developed when associated with engineering. Again, a document has quite recently been issued giving the distribution of college and university graduates among the professions and various walks of life, including agriculture. This survey evidently takes a similar view of the scope of agriculture, for we read in the deductions from the analysis that "in spite of the comparatively large number of agricultural courses, farming does not attract and never has attracted a very large number of college graduates." It may be mentioned in passing that the list of institutions studied includes only three of the state universities of the central west having courses in agriculture, and not a single separate college of agriculture and mechanic arts. The largest quota of graduates entering farming from the colleges included in the analysis is reported as less than four per cent, in the years 1836 to 1840, a time when there were, of course, no agricultural courses in any American colleges. After this the deduction follows (from data ten years old or more for fully half the institutions) that "although the number of graduates entering agricultural pursuits is increasing, it is not increasing so rapidly as the number entering other professions. Consequently the curve for the college-bred farmer is falling."

It is hoped that some time we may have reliable statistics on the graduates of land-grant colleges, made on a basis which will show not only how many are going into farming as a business, but how many are entering the broader field which the agricultural colleges represent. Until we have this and a recognized distinction between the duty of these institutions toward farming as a trade, and toward the immeasurably broader field of agriculture as a great fundamental

industry, a condition under which a large share of the people live, a subject with its professional as well as its trade aspects,—until then the success of these colleges will continue to be measured by conflicting standards, often inadequate and unfair.

As President Stone well said: "One must know their history to appreciate their vigor and strength; must come in touch with the quality and character of their work; must grasp their scope and their relation to the life of the people, in order to comprehend their place in the educational world."

Fifty years is a short time as the world reckons time. It is a short time in which to bring about a new attitude toward education, to develop pedagogic methods suited to the needs of a new department of it, and to exert so vital an influence on higher education in general. It is a short time to lay the foundation for a science of agriculture, and supplant the rule of thumb by the rule of reason.

To-day nearly everyone recognizes the power and might of science, and nearly everyone pays it at least outward homage. The common laborer on the farm believes in its possibilities, just as does the manufacturer, the man of large business interests, and the house-keeper.

But this is a distinctly modern attitude. Only a half century ago the foundation of one of the institutions benefiting by the land-grant act was attacked on the ground that science is antagonistic to humanity. The contention was that science was unsuited to be an instrument of education because it dealt with nature rather than with man. To-day such a view would find scant support. Science is seen to be intensely human, and science in the service of man has become a watchword of progress. Half a century has demonstrated to the world something of the magnitude of its power to make for human betterment; and the most convincing and widely heralded illustrations of this have come through agriculture.

It is safe to say that no single factor has had a greater influence in bringing about this change in attitude than the agricultural investigation at these institutions, and their remarkable activity and success in popularizing science.

RECENT WORK IN AGRICULTURAL SCIENCE.

AGRICULTURAL CHEMISTRY—AGROTECHNY.

Technical methods of chemical analysis, edited by G. LUNGE ET AL., trans. and edited by C. A. KEANE ET AL. (London, 1911, vol. 2, pts. 1, pp. XXVII+610; 2, pp. XII+611-1252, figs. 149).—Among the subjects taken up in these parts of this work (E. S. R., 21, p. 105) are artificial manures, feeding stuffs, ammonia, and synthetic and naturally occurring organic dyes.

Solubility determinations in agricultural chemistry, A RINDELL (*Akad. Handlingsskr. Helsingfors*, 1910, pp. 67; *abs. in Jour. Soc. Chem. Indus.*, 31 (1912), No. 2, p. 84).—This is a general discussion of solubility, its importance in agricultural chemistry, and the methods of determining solubility.

In experiments with Thomas slag it was found that the phosphoric acid was present apparently in a very insoluble form. "Experiments with pure water after 65 days' stirring at 25° C., using 10 gm. of substance per 1,000 gm. of water, show that with Thomas meal 0.1790 gm. of calcium oxid and 0.0316 gm. of phosphoric acid dissolve, whereas from raw phosphates the solution only takes up from 0.00075 to 0.0025 gm. of phosphoric acid, except in the case of Mexico phosphate, which is more soluble than Thomas meal. These phosphates will be perhaps slightly more soluble in soil solutions, but water is far preferable as a solvent in such cases to the 2 per cent citric acid usually employed, in which the soil constituents have too great a solubility. Stress is laid on the difficulties of finding solubility methods applicable to agricultural problems to which no theoretical objections can be raised, and the importance of introducing physical chemical methods into these conceptions is emphasized."

A modification of the diphenylamin test for nitrous and nitric acids, W. A. WITHERS and B. J. RAY (*Jour. Amer. Chem. Soc.*, 33 (1911), No. 5, pp. 708-711).—This material has been noted from another source (E. S. R., 25, p. 804).

Determination of lithium, W. W. SKINNER and W. D. COLLINS (*U. S. Dept. Agr., Bur. Chem. Bul.* 153, pp. 38).—After a comprehensive review of existing methods for lithium, particularly in mineral waters, a modification of the Gooch method which has been developed and used in the Bureau of Chemistry is described. This method was found to be entirely satisfactory where weighable amounts of lithium were present.

Pyridin as a solvent for the lithium salts was found to be objectionable on account of its unpleasant odor, the difficulty of preparing and keeping it sufficiently free from water, and the fact that in water analysis usually very small quantities of lithium chlorid are to be separated from large quantities of sodium and potassium chlorid.

For the spectroscopic estimation of lithium the methods of Ballman, Bell, or Foehr, when modified to employ the alkalis as extracted by amyl alcohol, were found satisfactory. The quantitative spectroscopic method, however, is not deemed preferable to the Gooch method where weighable amounts of lithium are present.

A method of estimating calcium carbonate in soils, H. S. SIKKESWORTH (*Pharm. Jour. [London]*, 4. ser., 34 (1912), No. 2527, p. 394).—The method is as follows:

"Ten gm. of finely divided air-dried soil is treated with 100 cc. of roughly quarter-normal acetic acid, rotating the flask every time most of the soil settles, during 10 minutes. The same weight of soil is treated in the same manner with 100 cc. of distilled water. Twenty-five cc. of the filtrate from each extraction is evaporated in a platinum dish, ignited at a bright red heat for 30 minutes, and the residues of (principally) lime dissolved in 10 cc. or more if necessary of decinormal acetic acid. Titrating back with decinormal soda or potash and phenolphthalein gives the cubic centimeters equivalent to the lime in the residues. Subtracting the volume obtained from the control (which will not exceed 0.1 cc. in most soils), the remainder multiplied by 0.2 gives the percentage of calcium carbonate in the soil. The control experiment eliminates such bodies as the carbonates or organic salts of the alkalis, soluble organic calcium salts, calcium nitrate, etc. Acetic acid is chosen for the titration as it does not dissolve ignited iron oxid."

The results of tests with 4 soils are also included.

The estimation of ammonia in carbonated waters, G. D. ELDON and N. EVERS (*Pharm. Jour. [London]*, 4. ser., 34 (1912), No. 2527, pp. 394, 395).—The presence of carbon dioxide in water seriously interferes with the determination of ammonia in such waters by the Nessler method. The following method will overcome much of the difficulty:

After shaking the flask containing the water by the usual method, 500 cc. is transferred to a distilling flask and 5 cc. or more of normal sulphuric acid, according to the alkalinity of the water, is added. An equivalent amount of normal sodium hydrate and a sufficient amount of sodium carbonate are then added and the usual procedure for determining free and albuminoid ammonia followed.

Nitric nitrogen in mixed fertilizers, S. S. PECK (*Jour. Indus. and Engin. Chem.*, 3 (1911), No. 11, pp. 817, 818).—The reliability of the modified Gunning and Kjeldahl methods for determining total nitrogen in a mixture containing an addition of nitrate of soda was studied.

The author believes on the basis of his findings with a new procedure, which is given below, that good results can be obtained with the Gunning method providing the moisture content of the sample is not too high. There was no loss of nitrogen noted in a mixed fertilizer containing sodium nitrate and sodium phosphate, which was kept for a period of 4 months. The method used is as follows:

Ten gm. of the fertilizer was transferred to a beaker and stirred with some water for about 1 hour. The mixture was then filtered, and the residue washed until a total bulk of 500 cc. of filtrate was obtained. Twenty-five cc. of the filtrate was then distilled with sodium hydrate for ammonia nitrogen, 25 cc. more reduced with iron and sulphuric acid for determining the nitric nitrogen, and a further 25 cc. used for determining the total nitrogen by the Kjeldahl method (using a 500 cc. flask with mercury, sulphuric acid, and potassium sulphate).

The nitrogen in the residue which remained on the filter paper was also determined but it was necessary first to render it air dry.

Report of the committee on phosphate rock, W. D. RICHARDSON ET AL. (*Jour. Indus. and Engin. Chem.*, 3 (1911), No. 10, pp. 783-787).—This is a report of the committee appointed by the division of fertilizer chemistry of the American Chemical Society on the analysis of phosphate rock. It includes the report

subcommittees, on water, phosphoric acid, and iron and aluminum, and the work of 20 analysts.

The forms of phosphorus in cotton-seed meal, J. B. RATHER (*Texas Sta. Bul. 148, pp. 3-16*).—The preliminary portion of this work shows that fat in cotton-seed meal does not interfere with the extraction of the phosphorus compounds and their determination by the official volumetric method. Meal washed with ether yielded 0.213 per cent of phosphorus soluble in 0.2 per cent hydrochloric acid; unwashed meal 0.235 per cent. The lower results obtained when washing are thought possibly to be due to the extraction of lecithin.

Other tests showed that the phosphorus extracted by 0.2 per cent hydrochloric acid was much lower than the published results for water-soluble phosphorus. The phosphorus not extracted from meal by 0.2 per cent hydrochloric acid could not be precipitated by acidifying the alkaline (ammonia) extract with hydrochloric acid. The method of Forbes et al. (*E. S. R., 23, p. 303*) was not found to include any appreciable amounts of meta- and pyrophosphoric acids in the determinations of inorganic phosphorus.

"The phosphorus soluble in 0.2 per cent hydrochloric acid was about 25 per cent of the total phosphorus. The inorganic phosphorus (Forbes method), in the samples of cotton-seed meal examined was less than 5 per cent of the total phosphorus. The phosphorus in the hydrochloric acid extract of cotton-seed meal capable of being precipitated by magnesia mixture and not soluble in acid alcohol was about 16 per cent of the total phosphorus. After extraction with 0.2 per cent of hydrochloric acid the phosphorus remaining was insoluble in water but nearly completely soluble in 0.2 per cent ammonia. Magnesia mixture precipitated most of the phosphorus extracted by ammonia. Practically all of the phosphorus was precipitated from the aqueous extract of cotton-seed meal by lead subacetate and by copper acetate. The principal compounds containing phosphorus were separated, which give the same reaction as those relied upon for proving the presence of meta- and pyrophosphoric acid. We have no evidence that the samples of cotton-seed meal examined contain either pyrophosphoric acid or metaphosphoric acid."

See also a previous note by Crawford (*E. S. R., 23, p. 8*).

Lutein obtained from egg yolks, R. WILLSTÄTTER and H. H. ESCHER (*Hoppe-Seyler's Ztschr. Physiol. Chem., 76 (1912), No. 2-3, pp. 214-225, pl. 1; abs. in Chem. Abs., 6 (1912), No. 6, p. 761*).—The coagulum obtained by treating with alcohol yolks from 6,000 eggs, which weighed 110 kg., when extracted with acetone gave an extract containing lutein. The cholesterol and lecithin were precipitated from the acetone solution with petroleum ether, and 4 gm. of crude lutein was obtained by crystallizing from the concentrated petroleum-ether solution. With the exception of the melting point, which was between 192 and 198° C., the substance simulated xanthophyll. It differed from carotin in that it was more soluble in ethyl and methyl alcohol.

Soy-bean oil, H. MATTHES and A. DAHLE (*Arch. Pharm., 249 (1911), No. 6, pp. 424-435; abs. in Jour. Soc. Chem. Indus., 30 (1911), No. 18, p. 1124*).—"Soy-bean oil contains 94 to 95 per cent of fatty acids (present as glycerol esters), of which about 15 per cent consist of saturated acids (palmitic acid) and about 80 per cent of liquid unsaturated fatty acids. The latter were found to consist of about 70 per cent of oleic acid, about 24 per cent of linolic acid, and about 6 per cent of linolenic acid. Samples of the oils labeled 'purified' and 'unpurified' had the following characters, respectively: Specific gravity at 15° C., 0.9230, 0.9235; solidifying point, -11.5° C., -12° C.; refractive index at 40° C., 1.4680, 1.4680; acid value, 5.7, 1.71; saponification value, 192.3, 194.3; iodine value (Hbl., after 18 hours' action), 131.3, 132.6; Reichert-Meißl value, 0.75, 0.75;

Polenske value, 0.78, 1.06; elaidin reaction, positive. Exposure of the oil for 6 months (in daylight) to moist air increased the acid value but lowered the iodine value. Pure oxygen both in the absence and presence of moisture had no influence on the iodine value."

Valuation of tea, A. A. Besson (*Chem. Ztg.*, 35 (1911), Nos. 38, pp. 813-815; 90, pp. 830-832; *abs. in Analyst*, 36 (1911), No. 428, p. 454).—These are the results of examining about 90 samples of tea, 43 of which were Chinese tea, while the remainder were from Ceylon, Java, and India. In the investigation particular stress was placed upon the stem or stalk content of the samples, but the work shows that very little relation exists between the amount of stalk and the price and quality of the tea as determined by the tasting test. It was noted, however, that Java tea which is grown at an altitude of 4,500 ft. was much better in quality than that grown at an altitude of 1,800 ft.

Analyses of 90 samples of tea.

Kind of tea.	Moisture.	Stalk.	Ash.	Caffein.
	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
Chinese green tea.....	6.00-7.69	0.4-5.2	4.33-7.46	2.13-4.22
Chinese Foochow.....	6.29-9.06	4.1-17.5	4.30-5.73	2.23-3.66
Chinese Hankow.....	6.48-8.33	8.6-17.1	4.95-5.05	2.45-3.64
Ceylon tea.....	4.57-8.12	5.3-43.4	4.54-5.65	2.30-4.10
Indian tea.....	4.00-8.06	11.5-37.4	4.72-5.04	3.31-4.13
Java tea.....	8.22-10.50	4.4-26.9	5.53-7.32	2.22-4.54

Researches on the nature of enzyme action.—II, The synthetic properties of antiemulsin, W. M. BAYLISS (*Jour. Physiol.*, 43 (1912), No. 6, pp. 455-466).—"The intraperitoneal injection of emulsin does not give rise to the production of any true antienzyme, although precipitins for the proteins contained in the solution are produced. The inhibitory action of such immune serum on the action of emulsin in vitro is no greater than that of normal serum, as was also found by Coca, and is merely due to diminution of the optimal acidity. Neither normal nor immune serum is capable of synthetic action. Emulsin, on the other hand, will synthesize lactose and also the glucoside of glycerol. This synthesis by the enzyme is retarded by the presence of serum, presumably owing to diminution of acid reaction. Incidentally it is shown that emulsin is not of protein nature."

The determination of crude fiber in finely powdered materials, W. GREIFENHAGEN (*Ztschr. Untersuch. Nahr. u. Genussmittel*, 23 (1912), No. 3, pp. 101, 102).—The determination of crude fiber in materials like powdered cotton seed, cocoa, etc., by the König method presents several difficulties, notably as to the time required for the filtration process. The author recommends the use of a Buchner nutsche apparatus, 10.5 cm. in diameter, which contains a thin layer of asbestos fiber to serve as a filter, or, if a nutsche is not obtainable, a perforated porcelain plate may be substituted in filtering the undiluted hot fluid. The residue can be washed on the filter without any trouble. The author was able in a period of 2 hours to make 8 crude fiber determinations.

In regard to the determination of lecithin, P. SALZMAN (*Apoth. Ztg.*, 26 (1911), No. 91, p. 949; *abs. in Chem. Ztg.*, 36 (1912), No. 9, *Reper.*, p. 37).—GRIFFITH's method (*E. S. R.*, 22, p. 410) was found to give the best results.

The flocculation of lecithin and lecithin protein mixtures with acids, J. FRIEDSCHMIDT (*Biochem. Ztschr.*, 38 (1912), No. 3-4, pp. 244-251).—Aqueous suspensions of lecithin preparations possess optimum flocculation points in a definite hydrogen ion concentration. This concentration is a very strong acid

ure and lies between 10^{-3} and 10^{-4} , and depends upon the lecithin preparation under examination. Neutral salts were found to cause an even greater turbidity of the suspension, but had the disadvantage of inhibiting the flocculating process and changing the optimum.

By mixing lecithin and protein together a new complex is produced which at first flocculates very markedly but later causes only turbidity in the optimum points for pure lecithin. This, according to the author, is the first time in which it has been shown that a colloid, sensitive to an acid, may be influenced by the addition of another colloid.

Estimation of minute amounts of arsenic in foods, E. CLARK and A. G. WOODMAN (*U. S. Dept. Agr., Bur. Chem. Circ. 99, pp. 7, figs. 3*).—A modification of the Marsh-Berzelius method as applied to the estimation of minute amounts of arsenic in foods is described. The method makes use of the form of apparatus devised by Bishop for the determination of arsenic in sulphuric acid.^a In the method standard mirrors are prepared for comparison. Antimony, when present in the material under examination, must be removed before testing.

Honey and its analysis, F. MUTTELET (*Ann. Patisif., 4 (1911), No. 30, pp. 192-196*).—This is a bibliography of the literature in regard to the chemistry of honey. See also a previous note (*E. S. R., 25, p. 109*).

Examination of marmalades and milk chocolates, HÄRTEL (*Chem. Ztg., 34 (1910), No. 141, p. 1256; abs. in Chem. Abs., 6 (1912), No. 6, p. 781*).—"The author prefers to filter off the insoluble matter, wash, dilute the filtrate to a definite volume, and analyze aliquot parts of this. For milk chocolate, the Baler and Neumann method is recommended, also the determination of the Reichert-Meissl number, which with a 10 per cent milk addition is 2.8 to 3, with 20 per cent 5.6 to 6."

Cider vinegar, F. E. MOTT (*Jour. Indus. and Engin. Chem., 3 (1911), No. 10, pp. 747-750*).—This is a description of a method which has for its purpose the detection of certain forms of adulteration in cider vinegar which are being practiced at the present time. It depends upon the relation of levulose and dextrose in pure cider vinegar as calculated from the percentage of reducing sugars present, expressed as dextrose, and the polariscope reading in degrees Ventzke as observed in the 200 mm. tube.

The detection of benzoic acid in coffee extract, H. C. LYTHERG and C. E. MARSH (*Jour. Indus. and Engin. Chem., 3 (1911), No. 11, p. 842*).—"Make the solution acid and extract several times with ether. Wash the combined ether extracts with water and extract with ammonia. Evaporate the ammoniacal extract to a small volume, adding ammonia from time to time to prevent it from becoming acid, and add a solution of manganese sulphate. Filter through a small filter, wash with as little water as possible, and add ferric chlorid to the filtrate, when a dark greenish precipitate will occur if benzoic acid is present. Evaporate to dryness in the casserole in which the precipitation was made, and sublime by placing an inverted funnel covered with a filter paper in the dish and heating over an asbestos gauze. Remove the funnel and determine the melting point of some of the crystals which, if benzoic acid, should be 121.4° C. The rest of the crystals may be dissolved in ammonia, the excess of ammonia evaporated and ferric chlorid added, when the characteristic flesh-colored precipitate will occur if benzoic acid is present."

"For quantitative purposes the method of Edmund Clark^b was employed with good results, as the natural reacting substance has but little influence."

^a *Jour. Amer. Chem. Soc.*, 28 (1906), No. 2, pp. 178-182.

^b *Science, n. ser.*, 30 (1909), No. 764, pp. 263, 264.

Spirit of nitrous ether, H. H. HANSON and A. K. BURKE (*Moist. Sta. Bul. 201*, pp. 147-158, fig. 1).—The factors bringing about the deterioration and decomposition of spirit of nitrous ether, commonly called sweet spirits of niter, were studied. A sample of the product kept in strict accordance with the directions given by the United States Pharmacopœia maintained constant strength for 60 days and decreased only slightly the next 30 days. Under less favorable conditions decomposition began at once and steadily continued.

When determining the amount of ethyl nitrite in spirit of nitrous ether by liberating the nitrogen dioxide and measuring the gas in the nitrometer, the volume did not become constant in from 30 to 60 minutes' time as one would be led to suppose by the directions given in the Pharmacopœia, but was found to increase slowly and at a varying rate, and was influenced by various factors. It is not deemed practicable to attempt to obtain an absolutely constant volume nor to apply a factor as a correction for the last traces of gas. A modified method of analysis, for which better results are claimed than with either the old or new Pharmacopœia methods, is described. The modified method is considered more economical in time and reagents, and can be more easily manipulated.

Use of saponin for homogenizing samples of milk to be examined, A. FROUIN (*Ann. Chim. Analyt.*, 16 (1911), No. 12, pp. 454, 455; *abs. in Chem. Abs.*, 6 (1912), No. 6, p. 781).—It often happens that milk samples destined for examination after standing for several months can not be properly homogenized by shaking, etc. If bile is added to such milk a uniform suspension can be obtained, but the mixture putrefies very easily. When saponin is added to milk previously neutralized to litmus with ammonium hydroxide in amounts of 0.005 gm. to 100 cc. of milk, and the mixture is heated from 40 to 56° for 10 minutes amid frequent shaking, a well homogenized mixture is obtained which will not interfere with the analytical results.

A new method for determining fat and salt in butter, especially adapted for use in creameries, R. H. SHAW (*U. S. Dept. Agr., Bur. Anim. Indus. Circ. 202*, pp. 8, fig. 1).—The procedure consists of melting the butter at 100° F., mixing it thoroughly with a spatula or spoon and weighing off 20 gm. in a small beaker, transferring the melted butter to a special form of separating funnel of known weight with the aid of water, centrifuging in a Babcock centrifuge about 1 minute, drawing off the water containing the salt and then dissolving the curd with dilute sulphuric acid (9 cc. of cold water and 11 cc. of sulphuric acid). After centrifuging again for 1 minute the acid solution containing the curd is drawn off and the separatory funnel containing the fat is weighed. The separatory funnel and the special form of socket for holding it in the centrifuge are illustrated. Results obtained in the test compared reasonably well with those given by the official method.

The washings from the above test are used for determining the salt content, by estimating chlorine with a volumetric solution of nitrate of silver (14.325 gm. per liter), using a 10 per cent potassium chromate solution as the indicator. If the moisture content of the sample is known the percentage of curd can be found by difference.

The index of refraction of the mixed acids of fatty oils, W. B. SMITH (*Jour. Indus. and Engin. Chem.*, 4 (1912), No. 1, pp. 36-38; *abs. in Jour. Soc. Chem. Indus.*, 31 (1912), No. 3, p. 139; *Science*, n. ser., 35 (1912), No. 897, p. 581).—“The relation between the refraction of the oil and the refraction of the acids depends upon the percentage of acid in the glycerids, being nearly independent of the total refraction and of the iodine value.”

The ratios between the refraction of oils and their insoluble acids were determined. For linseed, cod-liver, soy-bean, corn, rape-seed, cotton-seed, rap-

oil, and olive oils, the figure fluctuated between 0.9933 and 0.9947, while for coco oil, lard, lard stearin, oleostearin, cacao butter, palm-nut oil, butter (renovated), coconut oil, and a mixture of cotton-seed oil and oleostearin it was between 0.9923 and 0.9941.

The above figures are in accord with those which can be calculated from published refractive indexes and with the ratio of the refraction of fatty acids and triglycerids. The saturation of the acid has little effect upon the ratio, which is 0.9938 for stearin, olein, linolin, and linolenin, and with the lower acids a decrease, as with palmitin 0.9922 and laurin 0.9905.

Some typographical errors in reference books are pointed out, particularly in regard to the refractive index usually published for the insoluble acids of olive and rape oils and cacao butter. Olive oil is said to be low by about 0.005.

Coconut fat with a high iodine number, W. VAUDEL (*Ztschr. Öffentl. Chem.*, 18 (1912), No. 3, pp. 46, 47).—The findings were practically the same as those of Richardson, previously noted (*E. S. R.*, 26, p. 611).

Abnormal beeswax, G. BUCHNER (*Ztschr. Öffentl. Chem.*, 18 (1912), No. 5, pp. 94, 91).—A discussion of the analytical results obtained with beeswax of known (East African, Italian, and Spanish) and unknown origin. In most cases it was noted that where the free acidity was normal or slightly higher there was a diminution in the ester figure and an increase in the hydrocarbon content.

In regard to the separation of organic phosphorus compounds of feedstuffs, F. FRIEDLING and A. HECKING (*Biochem. Ztschr.*, 37 (1911), No. 5-6, pp. 35-46).—Stutzer's method (*E. S. R.*, 20, p. 173) utilizes nitric acid for dissolving the precipitate obtained with calcium chlorid and ammonium hydroxid and reprecipitates with molybdate. According to the results of this work the method can be employed only for the separation of inorganic phosphorus from acthia, casein, nuclein, and sodium nucleate, and not when phytin is present. With appropriate modifications in the method it may be possible to extend its use to the examination of plant materials containing phytin.

The determination of moisture content of beet seeds, H. FLAHN (*Centbl. Zuckerindus.*, 19 (1911), No. 46, pp. 1549, 1550, fig. 1; *abs. in Chem. Abs.*, 6 (1912), No. 6, p. 812, fig. 1).—The usual method utilized for this purpose consists of drying 5 gm. of the seed balls for at least 14 hours to constant weight. This, however, does not include colloid water. If these samples are weighed directly in the oven, illustrated in the original article, the time of drying can be reduced to from 5 to 6 hours.

Experimental work showed that the time could not be shortened by subdividing the sample and heating higher, for some of the 'colloid water' was driven off. The decrease in weight of 5 gm. after 60 minutes was in proportion to the amount of water in the sample. A table was constructed, as the average of a large number of determinations, showing the decrease in weight after 30 minutes and 60 minutes and the respective percentages of water. The moisture content should be taken when constant weighings are first observed, generally after 110 to 125 minutes, according to moisture content."

A chemical-technical vade mecum for sugar refineries, A. GRÖGER (*Chemisch-Technisches Vademecum für Zuckerfabriken. Prora, vols. 1, 1901, pp. XVI+573; 2, 1906, pp. XV+344; Brunn, vol. 3, 1911, pp. XII+697*).—This is a digest of the literature pertaining to the chemo-technology of the sugar industry. The literature from 1851 to 1910 is considered.

The carbohydrate constituents of Para rubber; separation of 1-methyl-phenol, S. S. PICKLES and B. W. WHITEFIELD (*Proc. Chem. Soc. London*, 27 (1911), No. 383, p. 54; *Bul. Imp. Inst. [So. Kensington]*, 10 (1912), No. 1, pp. 2-47).—A sample of Para rubber was found to have a very high percentage of

acetone-soluble substances, which are usually reported collectively as resin. On making a close examination of the so-called resinous substances it was found that 2.7 per cent of them consisted of a carbohydrate which was identified as l-methylinosit.

In regard to helianthus tubers for alcohol production, J. VON HÉRICHT-TÖRÉ and A. VON OSZREBOWSKY (*Kisérlet. Közlem.*, 14 (1911), No. 4, pp. 589-594).—From the results obtained by analysis and laboratory fermentation tests with helianthus tubers (*Helianthus doronicoides*), it seems that this is a good source of raw material for producing alcohol. The refuse also contains a high fat and protein content, and is considered more nutritious than potato slops obtained from distilleries for feeding stock.

Annual reports of the progress of chemistry for 1911, edited by J. C. CAIN and A. J. GREENAWAY (*Ann. Rpts. Prog. Chem.* [London], 8 (1911), pp. IX+319).—This publication deals with the progress made in general, physical, inorganic, organic, analytical, physiological, agricultural, and mineralogical chemistry, vegetable physiology, and radioactivity during the year 1911.

Proceedings of the twenty-eighth annual convention of the Association of Official Agricultural Chemists, edited by H. W. WILEY and ANNE L. PIERCE (*U. S. Dept. Agr., Bur. Chem. Bul.* 152, pp. 268, figs. 4).—This is the official report of the proceedings of the convention held at Washington, D. C., Nov. 20 to 22, 1911, a summarized account of which has been previously noted (*E. S. R.*, 26, p. 97).

METEOROLOGY—WATER.

Monthly Weather Review (*Mo. Weather Rev.*, 40 (1912), Nos. 5, pp. 659-813, pls. 10, fig. 1; 6, pp. 815-976, pls. 9, figs. 6).—In addition to the usual climatological summaries, weather forecasts and warnings for May and June, 1912, notes on the application of upper-air observations to weather forecasting for May and June, 1912; river and flood observations, lists of additions to the Weather Bureau Library and of recent papers on meteorology, a condensed climatological summary, and climatological tables and charts, these numbers contain the following special papers:

No. 5.—May, 1912, Flood in Michigan, by F. H. Coleman; The Effect of the Time of Observation on Mean Temperatures, by C. A. Donnel; The Annual Rain-fall and Temperature of the United States, by G. A. Lindsay; Unusual Hail-storm, Wichita, Kans., by R. H. Sullivan; Snow Survey on Pole Creek Watershed, Sanpete County, Utah, by B. F. Eliason; Notes on the Rivers of the Sacramento and Lower San Joaquin Watersheds during May, 1912, by N. B. Taylor; Notes on the Streams of the Upper San Joaquin Watershed, by W. E. Bonnett; and Studies in Frost Protection, Effect of Mixing the Air (illus.), by A. G. McAdie.

No. 6.—Special Notes on the Weather in Florida during June, 1912, by A. J. Mitchell; Severe Storms of June 16, 1912, by J. M. Kirk; Drainage of American Bottoms, by C. J. Root; Tornado in Southwest Missouri, June 15, 1912, by G. Reeder; Electric Storms in Western Kansas, by S. D. Flora; Flood in the Colorado, by F. H. Brandenburg; Snow Slides and Slips (illus.), by L. Peugnot; Some Effects of Surface Slope on Climate, by J. C. Alter; Notes on the Rivers of the Sacramento and Lower San Joaquin Watersheds during June, 1912, by N. B. Taylor; Notes on the Streams of the Upper San Joaquin Watershed, by W. E. Bonnett; Weather at Point Reyes Light, Cal., during June, 1912, by J. Jones; Preserving Mammal Carcasses from Frost, by G. P. Rixford; Heating the Atmosphere, by A. G. McAdie; Convenient Conversion Table for Frost Work, by A. G. McAdie; Severe Local Storm at Pocatello, Idaho, by A. B.

Teale; Mammato-cumulus Clouds (illus.), by W. J. Humphreys; Unusual Hallstone Formation (illus.), by D. J. Lingle; and Hall in the Tropics.

Meteorological observations at the Massachusetts Agricultural Experiment Station, J. E. OSTRANDER and H. W. ANGIER (*Massachusetts Sta. Met. Bul.* 223, 224, pp. 4 each).—Summaries of observations at Amherst, Mass., on pressure, temperature, humidity, precipitation, wind, sunshine, cloudiness, and casual phenomena during July and August, 1912. The data are briefly discussed in general notes on the weather of each month.

Annual report of the director of the [Philippine] Weather Bureau for the year 1908, J. ALBUE (*Ann. Rpt. [Philippine] Weather Bur., 1908, pt. 3, pp. 276*).—A record of meteorological observations at the secondary stations in 1908.

The influence of climatic conditions on the agricultural industry of Germany, A. SCHNIDER (*Landw. Hefte, 1912, No. 1, pp. 27*).—This is a brief general discussion of the subject.

The conservation of snow, J. E. CHURCH, Jr. (*Sci. Amer. Sup., 74 (1912), No. 1914, pp. 152-155, figs. 11*).—This article describes apparatus and methods used by the Nevada Station in studying the influence of forests in conserving snow on mountains.

It was found that snow tanks or gages were inefficient because of high winds, but that the snow could be quickly and accurately measured by means of the snow sampler described. By means of evaporation measurements it was possible to make allowance for the loss of moisture due to this cause. The only factor left undetermined was that of absorption by the soil. This is "roughly determined for given localities by subtracting the stream flow from the net moisture content of the snow field; that is, the moisture content after due allowance has been made for evaporation. . . .

"The seasonal survey is now being extended to the study of the relation of typical slopes to each other to determine a method of forecasting the probability and magnitude of floods.

"There can no longer be any question of the direct influence of forests in delaying the melting of the snow and thus in retarding stream flow at the very time when floods normally occur. It is also equally true that forests, if too dense, fail to attain their maximum efficiency as conservers of snow. On the other hand, the planting of timber screens at strategic points on exposed slopes will greatly increase their capacity to store more snow.

Drinking water supply of primitive people, A. HABERLANDT (*Mitt. Justus Perthes' Geogr. Anst., 1912, Ergänzungsh. 174, pp. VI+57*).—The subject is discussed mainly from the anthropological standpoint and with special reference to the arid regions of the earth.

SOILS—FERTILIZERS.

Soils of the eastern United States and their use, XXXVIII-XL, J. A. BONSTEEL (*U. S. Dept. Agr., Bur. Soils Circls. 65, pp. 15; 68, pp. 21; 69, pp. 14*).—These circulars discuss the following soil types:

Circular 65, Muck and Peat.—As defined, peat consists of nearly pure, partially decayed remains of vegetable tissue. Muck consists of such material mingled with an appreciable amount of extraneous mineral matter. It is also more completely disintegrated than peat in most cases. Of such areas, nearly 1,000,000 acres have been surveyed and mapped by the Bureau of Soils.

The installation of proper drainage is the first step in the utilization of these soils for crop production. Primarily the soils are best suited for the production of special purpose crops, but considerable areas are used for the growing of general farm produce. Among the special purpose crops which have been grown

with success are cabbage, onions, celery, lettuce, spinach, carrots, beets, turnips, and peppermint. Applications of potash and phosphatic fertilizers, and with many crops lime, have been found especially profitable. Coarse stable manure has also been used to advantage.

Circular 68, Meadow.—The term meadow is here used to designate "those low-lying, frequently somewhat swampy areas found along stream courses and tidewater embayments, which are subject to overflow and which are chiefly devoted to pasturage and the production of hay, when used for agricultural purposes, though usually occupied by trees and dense undergrowth when in their natural condition." Meadow areas of this classification have been surveyed and mapped by the Bureau of Soils in 173 areas in 31 States, aggregating a total of 3,086,829 acres.

The necessity for protection of these soils from overflow and for drainage is pointed out. "In the more northern States the production of grass for mowing or pasturage is the chief use made of the cleared meadow areas. Corn, oats, and market-garden crops are also produced. In the Piedmont Plateau region meadow constitutes some of the best corn soils of the region." In the Southern States the areas are partly devoted to cotton, corn, sugar cane, Bermuda grass, lespedeza, and vegetables, with a growing tendency toward corn and grass production. In the Central and north Central States these soils constitute important grass, corn, and wheat lands.

Circular 69, Marsh and Swamp.—The term swamp is here used to designate all areas which in their natural condition are too wet for the production of any crop. The word marsh designates low, wet, treeless areas usually covered by standing water and supporting a growth of grass and rushes. The marsh is subdivided into fresh water and tidal marshes. Soils of these classes have been surveyed and mapped by the Bureau of Soils to the extent of 2,355,240 acres.

The soils of these areas are well charged with organic matter and may be mucky or peaty. Drainage is the first requisite for their agricultural utilization. In the Middle Atlantic States these soils, when reclaimed, are well suited for the production of corn, cotton, and hay. Some of the tidal marsh areas are devoted to the production of rice of a high quality. In the central prairie States the reclaimed swamp lands constitute some of the most fertile and productive of the corn, oat, wheat, and grass lands.

The soils of Tripoli, P. VINASSA DE REGNY (*Coltivatore*, 58 (1912), Nos. 1, pp. 4-8; 2, pp. 38-42, fig. 1; 3, pp. 70-73, figs. 3; 4, pp. 101-105, fig. 1; 5, pp. 135-138, fig. 1; 6, pp. 166-170, fig. 1; 7, pp. 197-201, figs. 2; 8, pp. 231-236, figs. 2) obs. in *Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases*, 1 (1912), No. 6, pp. 1272-1275).—This is an account of observations on the typical soils of Tripoli, viz, the oasis sand, the desert sand, and the soils of Cyrenaica.

The oasis sand is stated to be very fertile. The soil is decidedly sandy, being composed of about 12 per cent gravel (over 1 mm. in diameter), 15 per cent coarse sand ($\frac{1}{4}$ to $\frac{1}{2}$ mm.), with about 90 per cent of the remainder of colloidal character. Of the soil material 46 per cent is soluble in hydrochloric acid. The carbonates form about 43 per cent of the soil.

The desert sand lies between the coast and the Jebel. The sand particles of this soil exceed 71 per cent, whereas the colloidal material is below 29 per cent. Scarcely 6.5 per cent of the soil is soluble in hydrochloric acid. This soil differs from the oasis sand in having a smaller percentage of coarse constituents and of calcium carbonate. The proportion of these constituents, however, increases gradually with the length of time that the soil has been under cultivation, the calcium carbonate being as high as 44 per cent in the older gardens and as low as 2.5 per cent in the newer gardens.

The rainfall in this section is too small to produce chemical decomposition in the soil. It is believed that the possibilities are excellent for utilizing the waters, which are retained under the sand by an impervious clay formation and afford an abundant and easily accessible supply of water.

Cyrenaica contains large areas of red soils of a clayey nature and high water-retaining power. The organic constituents varied from 3.9 to 8.3 per cent; potash from 0.14 to 0.83 per cent; phosphoric acid from 0.11 to 0.79 per cent; and nitrogen from 1 to 1.5 per cent.

Researches on properties of peat soils of Picardy, E. COQUINÉ (*Recherches sur les Propriétés des Sols Tourbeux de la Picardie*. Paris, 1912, pp. 180, pls. 9, figs. 24; abs. in *Bul. Soc. Nat. Agr. France*, 72 (1912), No. 6, pp. 507-509; *Rev. Gén. Sci.*, 23 (1912), No. 16, pp. 641, 642).—This is an account of investigations on the character of the vegetation and the chemical and physical properties of these soils.

It is stated that the vegetation of large areas of these peat lands is similar to that of arid regions. This peculiarity is attributed to the fact that, although the absorptive power of the soil for water is enormous, the water is not given up to the plants until the point of saturation is reached. The soils are in very poor physical condition and are also deficient chemically.

Black soils (chernozem), P. KOSOVICH (*Die Schwarzerde (Tschernosiom)*. Vienna, Berlin, London, 1912, pp. 156+VIII, figs. 29).—This has already been noted from another source (*E. S. R.*, 26, p. 812).

Gray sand and ortstein, H. NIKLAS (*Naturw. Ztschr. Forst u. Landw.*, 10 (1912), No. 7, pp. 369-379).—This is a summary of the present knowledge on the formation and composition of ortstein and gray sand.

The chemical composition of red saline clay, E. MARCUS and W. BILTZ (*Ztschr. Anorgan. Chem.*, 77 (1912), No. 1, pp. 119-123).—Detailed analyses of samples of red clay obtained from Schönebeck are compared with the chemical composition of blue clays from the same source and of clays from various other sources. The characteristic difference in color of the Schönebeck clays is shown to be due to the differences in amount and form of iron present.

A peculiarity of the mole, H. M. GMELIN (*Cultura*, 24 (1912), No. 287, pp. 277-279).—The author found that the calcium carbonate content of the subsoil transported by moles to the surface was much higher than that of the surface soil. This led him to believe that the results of hydrochloric acid tests of the lime requirements of soils may be unreliable if the sample of soil happens to be taken from a mole hill, and this may be unavoidable owing to the smoothing over of the hills by mechanical agencies.

The cause of the absorbent power of soils, U. PRATOLONGO (*Staz. Sper. Agr. Ital.*, 45 (1912), No. 1, pp. 5-54; abs. in *Chem. Zentbl.*, 1912, I, No. 13, p. 1948).—This article gives in some detail the results of studies of the action of saline solutions on zeolites, leucite, and soils. Among the more important conclusions reached is that the absorptive power of soils can not be explained by the formation of solid solutions. See also a previous note (*E. S. R.*, 25, p. 21).

A method of retaining water in the soil, K. KREBS (*Illus. Landw. Ztg.*, 32 (1912), No. 32, p. 307; abs. in *Internat. Inst. Agr.*, [Rome], *Bul. Bur. Agr. Intel.* and *Plant Diseases*, 3 (1912), No. 6, p. 1280).—Comparative tests of different methods of planting crops with a view of holding the maximum amount of snow and thus increasing the water supply in the soil are reported.

The cooperation of organisms in clay formation, P. RÖHLAND (*Biochem. Ztschr.*, 39 (1912), No. 3-4, pp. 205-207; abs. in *Jour. Chem. Soc.* [London], 1912, No. 5854, p. 484).—"The odor of certain clays, which can be removed by ferric saccharate solutions, suggests to the author the possibility that clay may owe its formation to the action of micro-organisms."

The flocculating power of some soluble salts on the clay substances of the soil, G. MASONI (*Stav. Sper. Agr. Ital.*, 45 (1912), No. 2, pp. 113-159; obs. in *Chem. Zentbl.*, 1912, I, No. 18, p. 1496; *Jour. Soc. Chem. Indus.*, 51 (1912), No. 10, p. 504; *Jour. Chem. Soc. [London]*, 102 (1912), No. 597, II, pp. 677, 678).—

"From the results of a large number of experiments the author concludes that chlorids have a greater flocculating power than nitrates and sulphates. Calcium salts are more active than potassium and ammonium salts, and the latter are more active than sodium salts. There appears to be no simple relation between the quantity of a salt and its flocculating power, but the flocculating power of the solution of a salt depends upon the ionic concentration and the degree of dissociation. . . .

"The flocculating power is a function of the cation, the anion being without influence. The flocculating power depends upon the valency of the cation, but not upon its atomic weight. If the value of the flocculating power for the sodium ion be taken as 1, then for the potassium or ammonium ion it is 2.4 and for the calcium ion 5.7. The flocculating power of a salt on the clay substance of a soil is directly connected with the absorptive power of the soil for the salt, and may be regarded as due to an interchange of radicals between the salt and the soil."

Biochemical studies on soils subjected to dry heat, F. J. SAEVER and E. D. CLARK (*Biochem. Bul.*, 1 (1912), No. 3, pp. 413-427, pt. 1).—A study of extracts from soils subjected to different temperatures showed that the color and soluble matter varied with the temperature but not with the length of time of heating. The growth of oats was slightly increased in soils heated at low temperatures, 90 to 120° C., but was retarded progressively as the temperatures increased above this point.

"Retardation seems not to be due to the toxic effects of the substances rendered soluble, but to the fact that they are present in such large quantities that the plant is unable to absorb them. The influence of heated soils on the growth of fungi is the opposite of that on the growth of green plants, the growth becoming more luxuriant as the temperature is increased. This can be explained by the fact that fungi, unlike most green plants, have the power of adapting themselves to nutrient media of a comparatively high degree of concentration. The beneficial or harmful results, therefore, of the heating of a soil for the growth of plants depends upon the temperature to which the soil has been heated as well as upon the nature of the soil and the plant. The preference of certain plants for burned-over areas or for peaty soils may be explained by the acidity of such situations, a supposition we are testing by blueberry-culture experiments now under way."

Bacterial slimes in soil, R. GREIG-SMITH (*Proc. Linn. Soc. N. S. Wales*, 66 (1911), pt. 4, pp. 609-612; *Centbl. Bakt. [etc.]*, 2, Abt., 34 (1912), No. 8-9, pp. 226, 227).—This note briefly presents evidence which is thought to indicate the presence of bacterial slimes in soils.

The determination of Rhizobia in the soil, R. GREIG-SMITH (*Proc. Linn. Soc. N. S. Wales*, 36 (1911), pt. 3, pp. 492-503; *Centbl. Bakt. [etc.]*, 2, Abt., 34 (1912), No. 8-9, pp. 227-229).—A medium specially suited to this purpose is described.

The rôle of *Streptothrix* in the soil, A. FOUSEK (*Mitt. Landw. Lehrkanz. K. Hochschule Bodenkul. Wien*, 1 (1912), No. 2, pp. 217-244).—Determinations of the number of *Streptothrix chromogena* and *S. alba* in different soil types and studies of the assimilation of nitrate, ammoniacal, and amid nitrogen, and free nitrogen of the air by these organisms and their effect on the decomposition of peptone, dried blood, bone meal, and straw, and on the growth of plants are reported.

The results show that *Streptothrix* composed from 20 to 30 per cent of the micro-organisms in loam soils, from 8 to 15 per cent in clay soils, and from 7 to 10 per cent in sands. Fallow soils contained larger numbers than cultivated soils. The organisms were also abundant on roots of *Aspidium*, *Quercus*, *Ulmus*, *Gramineæ*, and *Papilionaceæ*, and on decaying plant debris.

Streptothrix decomposed peptone, blood, bone meal, and straw, splitting off large quantities of ammonia. For culture purposes media containing milk sugar and grape sugar were especially well adapted. Cellulose may also be used as a source of carbon. The optimum temperature for the development of the organisms was 20° C., although there was a good, but very slow, development at lower temperatures.

Streptothrix produced no nitrification. On the other hand, there was strong reduction of nitrates to nitrite, but without direct denitrification, i. e., without loss of free nitrogen.

In view of the ready assimilation of nitrates, ammonium compounds, urea, and uric acid, it would appear that these organisms are instrumental to a prominent degree in fixing the nitrogen of fertilizers and soils and thereby finishing the loss from denitrification. There was no assimilation of free nitrogen by *Streptothrix*, but the presence of these organisms did not diminish the assimilative capacity of *Azotobacter* for free nitrogen.

Streptothrix had a favorable effect on the growth of certain plants. This may be regarded as being due to the rapid decomposition of the organic matter whereby plant nutrients, especially assimilable nitrogenous compounds, are set free. It would also seem that these organisms aid in the production of nodules in *Papilionaceæ*.

The *agricere* and the bacteriotoxins of the soil, R. GREIG-SMITH (*Proc. Linn. Soc. N. S. Wales*, 36 (1911), pt. 4, pp. 679-699; *Centbl. Bakt. [etc.]*, 2. Abt., 34 (1912), No. 8-9, pp. 224-226).—The author reports experiments which led him to believe that the chief reason for the increased bacterial activity in soils following antiseptic treatment with such fat solvents as chloroform, ether, etc., is the removal of the fatty protective covering of the soil particles (*agricere*) referred to in a previous article (*El. S. R.*, 25, p. 525).

Beneficial effect of creatinin and creatin on growth, J. J. SKINNER (*Bot. Gaz.*, 54 (1912), No. 2, pp. 152-163, fig. 1).—In water cultures with wheat seedlings creatinin and creatin increased growth both in presence and in absence of nitrate. These substances were apparently able to replace nitrates in plant growth. They also increased the assimilation of phosphoric acid and potash.

Partial sterilization of soil, R. B. MCBRIDE (*Pharm. Jour. [London]*, 4. ser., 24 (1912), No. 2527, p. 381; *abs. in Chem. Abs.*, 6 (1912), No. 15, pp. 2127, 2128).—It is reported that the growth of sweet peas was increased by sprinkling the soil with a solution of potassium permanganate, 2 oz. to 25 gal. of water. The solution was also effective in destroying the green fly on rose bushes.

Partial sterilization of soil for greenhouses, E. J. RUSSELL and F. R. WETHERBRIDGE (*Pharm. Jour. [London]*, 4. ser., 34 (1912), No. 2524, pp. 286, 287).—This is an abstract of an article already noted from another source (*El. S. R.*, 26, p. 815).

Clearing heavy lands as adapted to Montaja and Panendjoan, E. VAN LANNER (*Reysmannia*, 23 (1912), No. 4, pp. 211-229, pls. 4).—The author describes a so-called ditching system of clearing, cultivating, and aerating land overgrown with dense second growth of shrubbery and grasses and isolated trees. The method is stated to be extensively and successfully used in the preparation of land for the cinchona plant in different sections of Java.

Reclamation of crawfish lands, W. D. GARRISON (*South Carolina Sta. Bul.*, 7, pp. 12, pls. 10).—The term crawfish lands is taken to represent the lower

coastal region of South Carolina. In order to determine the agricultural value of these lands, experiments were made at the coast station near Charleston during 1899 and 1910 in tile draining and the production of different vegetables, oats, corn, and cotton under applications of various fertilizer mixtures and materials. The drainage system was planned and partly installed by the U. S. Experiment Stations.

The results showed a marked profit from all the crops grown on the drained land. Lime in conjunction with a complete fertilizer was especially beneficial.

"The theory held by some people that the drainage of this land was impracticable, and that even if the water could be successfully removed the land would not be productive, has been entirely overthrown by the record of the past 2 years."

Sponge spicules in swamp soils, R. O. E. DAVIS (*U. S. Dept. Agr., Bur. Soils, Circ. 67, pp. 4, fig. 1*).—Microscopic examinations of swamp soils of Georgia showed a large number of spicules, the remains of fresh-water sponges, in the surface 6 in. of soil. These spicules were found to cause irritation of the feet of animals. *Maccenia millsii* was the most common of the spicules. Examinations of other soils from different parts of the United States showed only small quantities of spicules of a variable character. Applying soil free from spicules, as by mixing in some of the subsoil, is suggested as the most practical means of overcoming the difficulty.

Sponge spicules in certain soils, R. O. E. DAVIS (*Orig. Commun. 8 Internat. Cong. Appl. Chem. [Washington and New York], 15 (1912), Sect. VII, pp. 77-79*).—See above.

Present status of fertilizer investigations, F. K. CAMERON (*Amer. Fert. 57 (1912), No. 2, pp. 31-33*).—This is a brief review in which it is maintained that "the present status of fertilizer investigations, both theoretical and practical, is one of unrest and doubt."

Some secondary actions of manures upon the soil, A. D. HALL (*Agr. Gaz. Tasmania, 20 (1912), Nos. 2, pp. 54-59; 3, pp. 81-84; 4, pp. 144, 145; 5, pp. 182-188; 6, pp. 215-218*).—The more important points discussed in this article are summarized as follows:

"The long-continued use of sulphate of ammonia on soils poor in lime results in the soils becoming acid. The acidity is caused by certain microfungi in the soil which split up the sulphate of ammonia in order to obtain the ammonia, and thereby set free sulphuric acid. The infertility of such soils is due to the way all the regular bacterial changes in the soil are suspended by the acidity; instead, fungi permeate the soil and seize upon the manure. The remedy, as may be seen upon the Woburn plots, is the use of sufficient lime to keep the soil neutral. From the Rothamsted soils carbonate of lime is being washed out at the rate of 800 to 1,000 lbs. per acre per annum, the losses being increased by the use of sulphate of ammonia, but lessened by dung or nitrate of soda. Nitrate of soda, when applied to heavy soils in large quantities, destroys their texture. Some of the nitrate of soda gets converted into carbonate of soda, the action of plants and bacteria, and carbonate of soda, by coagulating the clay particles, destroys the tilth. The best remedies are the use of soot or superphosphate, the best preventive is the use of a mixture of nitrate of soda and sulphate of ammonia instead of either separately. Soluble potash manures and common salt may also injure the tilth of heavy soils through the production of a little soluble alkali by interaction with carbonate of lime in the soil. The remedy is to apply such manures in the winter or in conjunction with superphosphate."

biological method of preserving manure, C. BARTHEL and S. RHODIN (*Revue. Presse*, 39 (1912), Nos. 50, pp. 583, 584; 51, pp. 597, 598).—In previous experiments (E. S. R., 18, p. 918) one of the authors showed that the loss of ammonia from manure could be reduced by setting up lactic-acid fermentation in the manure. In further tests of the method, here reported, it was found that the addition of from 50 to 100 liters of whey to 1,000 kg. of manure (sprinkled on each layer) greatly reduced the loss of ammonia from the manure. The fertilizing efficiency as determined in experiments with potatoes, beets, oats, and rye was only 59 per cent as great for the untreated as for the treated manure.

Certain relations between the ash constituents of various fertilized plants, G. LEONCINI (*Staz. Sper. Agr. Ital.*, 45 (1912), No. 1, pp. 55-75; abs. in *Chem. Zentr.*, 1912, I, No. 13, p. 1049).—This is a preliminary report giving the results of a considerable number of analyses of plants fertilized in different ways, from which the author concludes that phosphoric acid is taken up by the plant most readily in presence of calcium and magnesium salts, less readily in the presence of potash salts.

Utilization of atmospheric nitrogen, T. H. NORTON (*U. S. Dept. Com. and Labor, Bur. Manfr., Spec. Agents Ser.*, 1912, No. 52, pp. 173, figs. 5; abs. in *Daily Cons. and Trade Rpts.* [U. S.], 15 (1912), No. 149, p. 1309).—This monograph describes in detail the present supply of nitrogen, and the scientific and technical features of the various processes which have been proposed for the production of ammonia and nitric acid from the air, as well as the technical and commercial aspects of the new industry which has been established through the practical application of certain of these processes. A short chapter is also devoted to the question of the utilization of coal waste and peat as sources of ammonia. A bibliography of the more important papers on the subject is given at the end of the report.

Discussing the possibilities of employing the new processes under American conditions, the author emphasizes the following points:

"The synthetic production of nitric acid from the atmosphere is a highly specialized process, dependent for the time being on exceptionally cheap sources of electricity. Many are laboring upon the problem of increasing the output per unit of electric power. Such experiments are most advantageously conducted in connection with the gigantic plants in Scandinavia.

"The case is different with cyanamid. Here is a product that can be easily produced wherever calcium carbide is manufactured. Its value as a fertilizer becomes more manifest each year. The items of its cost are easily controlled. It is a material from which our stock of cyanids can be economically produced. At present we send abroad annually \$750,000 for various cyanids. It is susceptible of application on a large scale in gold mining. In 1910 imports of cyanamid reached \$40,000, so that evidently its use in agriculture is recognized. The establishment of cyanamid works at several points on American soil, where water power is relatively cheap and earnest propaganda in connection with the employment of the new fertilizer in farming would constitute an important step in freeing our country from dependence upon foreign sources of combined nitrogen.

"The same may be said to some extent, but with considerable reserve, in regard to aluminum nitride. The manufacture of the compound involves even more power than that of cyanamid, and the transformation of the combined nitrogen into the form of ammonia is less expensive than in the case of cyanamid. Granting the correctness of the claims made in favor of this latest

nitrogen industry, the United States is certainly one of the countries specially favored for the establishment of the manufacture, as it possesses fairly extensive deposits of bauxite, the mineral serving for the fixation of nitrogen. There is much to warrant American enterprise in studying very closely the possibilities of this new industry. It promises to furnish ammonium compounds far more economically than any existing process and involves a simpler plant than that required for cyanamid or air nitrates.

"It will be noted that at present the methods of producing ammonia and ammonium compounds, more particularly the staple product, ammonium sulphate, seem to offer the larger field for the economic fixation of atmospheric nitrogen. The more complete utilization of the nitrogen present in coal, peat, etc., increases likewise the available supply of ammonia. In view of this trend in the general movement, coupled with the prospective depletion of the stock of Chile saltpeter, it is eminently desirable that steps should promptly be taken to ascertain, as nearly as possible, under what conditions and to what extent ammonium sulphate can satisfactorily replace Chile saltpeter for the most important crops.

"There is much diversity of opinion on this point, both in Europe and America. Some authorities assign to nitrogen in the form of ammonia a general value as fertilizer equal to that of nitrogen in the form of saltpeter. Others assign a lower value. Market quotations fluctuate, following naturally the laws of supply and demand, but frequently they show a higher valuation of ammonia nitrogen than of nitrogen in the form of nitrate. More definite data on this subject might aid naturally the plans of American investors in handling projects for establishing on American soil adequate plants for the domestic production of combined nitrogen.

"In conclusion it can be regarded as beyond doubt that the present achievements of applied chemistry in this field render it possible for American industry and American agriculture to face the threatened exhaustion of the nitrate deposits of Chile and the demands attendant upon a rapidly growing population without any feeling of apprehension. The processes already perfected and described in detail show that there is no early danger of a nitrogen famine. The continual perfection of the processes and the appearance at frequent intervals of novel additional methods, as well as the popularization of the new forms of combined nitrogen, all point to a steady movement forward, and to the assurance that combined nitrogen, as an industrial product, will be furnished on an increased scale without advance in cost above existing rates as fast as the demand is evident."

The fixation of atmospheric nitrogen by the use of aluminum nitride. F. MARRE (*Génie Civil*, 61 (1912), No. 2, pp. 30-33; *abs. in Chem. Abs.*, 6 (1912), No. 15, p. 2130).—The theory and the practical operation of this method of fixation of free nitrogen are described. A product is obtained which is not a definite compound, but contains about 31 per cent of nitrogen.

The behavior of commercial calcium cyanamid in storage and under the influence of soils and colloids, G. HENSCHEL (*Das Verhalten des technischen Calciumcyanamids bei der Aufbewahrung sowie unter dem Einfluss Kulturböden und Kolloiden. Diss. Leipzig*, 1912, pp. 72; *abs. in Zentr. Bakt. [etc.]*, 2. Abt., 34 (1912), No. 10-13, pp. 279, 280).—The author found that the decomposition of cyanamid was somewhat more rapid in dry sterilized soils and colloids than in those which contained micro-organisms. There was almost complete agreement between the intensity of cyanamid decomposition in sterilized media and ammonia formation in media containing micro-organisms. This was true for practically all soils experimented with except a humus moor soil rich in colloids and showing feeble bacterial activity. It was shown that the

humus of the soil was of special importance in connection with the cyanamid decomposition. There was an active formation of urea in cyanamid in storage, but no loss of nitrogen was observed.

Further investigations on lime nitrogen, C. J. MILO (*Meded. Proefstat. Java-Suikerindus.*, 1912, No. 16, pp. 427-527, pls. 6, fig. 1; *Arch. Suikerindus. Nederland. Indis.* 20 (1912), Nos. 15, pp. 431-472, pl. 1, fig. 1; 16, pp. 481-589, pl. 1).—This is a continuation of work previously noted (E. S. R., 25, p. 826). The results of the whole investigation are summarized in the abstract below.

Lime nitrogen as regards its transformation in the soil, C. J. MILO (*Meded. Proefstat. Java-Suikerindus.*, 1912, No. 20, pp. 601-634; *Arch. Suikerindus. Nederland. Indis.* 20 (1912), No. 27, pp. 1039-1072; *abs. in Chem. Zentbl.*, 1912, II, No. 46, p. 1393).—Previous investigations by the author (see above) dealt with the question of the transformation of lime nitrogen in storage. The present report gives an account of experiments to determine the transformation processes, fertilizing value, and effect of this material in the soil under Java conditions. A light and a heavy soil type were used in the experiments. The more important results of these studies are summarized as follows:

The lime nitrogen absorbed moisture and carbon dioxide from the atmosphere. Under such conditions there was a loss of nitrogen by volatilization. By storing the material under dry conditions the loss of nitrogen was reduced to a minimum. Calcium cyanamid during storage formed various decomposition products which depended to a more or less extent on the time, humidity of the atmosphere, and the temperature.

In heavy soils the fertilizing value was less for the old than for the new product, and for this reason the Kjeldahl method did not give a true estimate of the fertilizing value of the material.

Cyanamid was much less readily soluble in water than ammonium sulphate. Less cyanamid than ammonia was absorbed by the soil.

The transformation of lime nitrogen varied considerably as between heavy, strongly absorbent soils containing colloidal and catalytic substances and light, less absorbent soils. In the first type of soil the transformation was in two consecutive stages—(1) the production of cyanamid followed quickly by urea and (2) the formation of ammonium carbonate from the urea. The first is due to a chemico-physical action, whereas the second is most probably brought about by micro-organisms. The ammonia was readily absorbed by the heavy soil.

In case of the light soil the calcium cyanamid formed basic calcium cyanamid salts and free cyanamid. These compounds remained stable in the soil and were slowly transformed into ammonia, this slowness of transformation giving a chance for the production of dicyandiamid. The toxic action of lime nitrogen in light soils when the fertilizer is applied at the time of seeding was due to the presence of the cyanamid in the soil in its unchanged condition. Cyanamid was strongly toxic to plants.

Dicyandiamid, even in large amounts, did not prevent the germination of seeds. In the later stages of growth of the plants dicyandiamid had a tendency to cause a temporary drying of the tips and edges of the leaves.

In the heavy, strongly absorbent soils rich in colloidal and catalytic substances the toxic action of the cyanamid was lessened largely by the hydrolysis of cyanamid to urea. In case of the light soils with little colloidal and catalytic substances, the hydrolysis of the cyanamid may be prevented and polymerization to dicyandiamid may take place. A thorough covering and careful distribution of the lime nitrogen in the soil and an intimate contact of the colloidal and catalytic material with the calcium cyanamid tend to expedite the necessary transformation of the cyanamid to urea.

On the basis of the foregoing investigations the author makes the following practical suggestions:

Lime nitrogen is not adapted for top dressing or to acid soils and can not be recommended for light soils of low absorbent power.

Unusually heavy applications can not be recommended. In order to avoid dusting, it is recommended that the fertilizer be mixed with soil, though in some cases where there is little or no wind this may not be necessary.

Lime nitrogen should not be mixed with soluble phosphatic fertilizers, but mixing with potash salts is allowable if desired. The fertilizer should be applied from 4 to 14 days before seeding, the shorter periods being recommended for the heavy soils, with a longer period of time on light soils. It is recommended that the fertilizer be immediately and carefully covered and well mixed with the soil. In view of the fact that cyanamid is less readily absorbed than ammonia, heavy applications of water are not desirable until the transformation of the cyanamid to ammonia has taken place.

New observations on the behavior of nitrate in cultivated soil, J. VOGL (Centbl. Bakt. [etc.], 2. Abt., 34 (1912), No. 18-22, pp. 540-561; *abs. in Chem. Ztg.*, 36 (1912), pp. 1104, 1105; *Jour. Soc. Chem. Indus.*, 31 (1912), No. 20, p. 1000; *Chem. Abs.*, 6 (1912), No. 23, p. 3485).—Previous investigations having shown that there was a loss of free nitrogen from ammoniacal and nitrate nitrogen added to soils receiving calcium carbonate (E. S. R., 26, p. 226), the author made further studies to determine the influence of aeration of the soil on such loss of nitrogen from nitrates, using per 100 gm. of soil 0.32 gm. of sodium nitrate and 0.9 gm. of calcium carbonate. The water content of the soil was kept constant during the experiment and the soil was placed in shallow layers in porcelain dishes and frequently stirred, to provide aeration.

The results of the first series of experiments seemed to indicate that the loss of nitrogen in the transformation of the nitrates might be due to evaporation of water from oversaturated soil particles. In later trials, however, the evaporation of water from the soil was controlled, but still there was loss of free nitrogen. This loss occurred in all cases where the original water content of the soil was kept constant for a considerable time during the course of the experiment. A water content of about 15 per cent was sufficient to bring about the transformation. The soil changed in its physical appearance, becoming dry and powdery after a few days.

Apparently the nitrates were transformed suddenly and with great energy, and the resulting sodium carbonate brought about the changed appearance of the soil. The transformation process is thought to be a purely chemical one in which the nitrate nitrogen is in part reduced to lower oxides of nitrogen.

Influence of organic substances on the decomposition and action of nitrogenous compounds, GERLACH and DENSCHE (Mitt. Kaiser Wilhelms Inst. Landw. Bromberg, 4 (1912), No. 4, pp. 259-317).—In pot experiments with a loamy soil moderately supplied with organic matter it was found that the addition of easily decomposable organic compounds, such as grape sugar or straw, resulted in the conversion of soluble nitrogen salts, like ammonium sulphate and sodium nitrate, into insoluble protein compounds, which, however, were later readily decomposed and assimilated by plants. In soil receiving no applications of organic matter there was a distinct gain in total nitrogen in 2 months. With additions of grape sugar, straw, ammonium sulphate, and sodium nitrate the results were variable and inconclusive in this respect.

The action of lime nitrogen and calcium nitrate in the field, GERLACH (Mitt. Kaiser Wilhelms Inst. Landw. Bromberg, 4 (1912), No. 4, pp. 312-353).—In field experiments with oats, rye, and potatoes lime nitrogen proved distinctly inferior and commercial calcium nitrate about equal to sodium nitrate.

The phosphate deposits of the United States, W. H. WAGGAMAN (*Amer. Fert.*, 37 (1912), No. 2, pp. 34-36).—This is a brief description of the phosphate deposits of the United States, with notes on their exploitation. *

The composition of certain Palestine phosphates and their fluorin content, G. DANIELLI (*Rend. Soc. Chim. Ital.*, 2. ser., 4 (1912), No. 7, pp. 165-173).—Reports by other investigators on these phosphates are reviewed, and detailed analyses of a number of samples are presented. These show from 25.5 to 39.28 per cent of phosphoric acid and from 3.5 to 4.88 per cent of fluorin. The amount of calcium carbonate present varies widely, ranging from 1.87 to 33.73 per cent. The peculiar characteristics and geological relationships of these phosphates are briefly discussed.

The utilization of the phosphates of central Russia (*Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases*, 3 (1912), No. 6, pp. 1286-1290).—This is a brief summary of information on this subject with a number of references to the literature.

It is stated in brief that "in central and eastern Russia there are extensive phosphate deposits sufficient for the needs of that part of the country. These minerals, though not rich enough to interest directly the international market, do so indirectly, because when industrially prepared they might emancipate the above regions from the importation of foreign phosphatic manures. The utilization of the above phosphates is important also from the point of view of international agricultural production, for by favoring the consumption of manures, which at present is hampered by the cost of carriage, it promotes the development of agriculture in these important cereal and flax producing regions."

[Experiments with different phosphates], D. N. PRIANISHNIKOV ET AL. (*Izv. Moskov. Selsk. Khoz. Inst. (Ann. Inst. Agron. Moscou)*, 18 (1912), No. 1, pp. XIII+1-179, figs 17).—Accounts are given of experiments in the preparation of superphosphates from different Russian phosphorites, and of tests of the fertilizing value of various kinds of crude and manufactured phosphates.

It was found in general that certain of the Russian phosphorites could be economically converted into superphosphate. The crude phosphates showed a low fertilizing value when used on sandy soils. Superphosphates and precipitated phosphates prepared from the crude phosphates, however, showed a decidedly higher fertilizer efficiency. So-called Viborg phosphate, prepared from various crude phosphates (by fusion with sodium carbonate), proved more effective than phosphatic slag.

Tests of the treatment of steamed bone and crude phosphate with potassium bisulphate indicated that this method may replace the use of sulphuric acid in the manufacture of superphosphates from bones and natural phosphates. The addition of iron bisulphid to crude phosphate was found to decrease the yield. Addition of small amounts of ferrous and ferric sulphates were without effect, but larger amounts were injurious. The addition of ammonium chlorid favored the solution of the phosphate, and mixtures of ammonium chlorid and sodium nitrate were more effective in this respect than sodium nitrate alone. With the most favorable combination the yield was very nearly as great as with superphosphate. Mixtures of calcium nitrate and ammonium sulphate exerted very favorable action on crude phosphates, Thomas slag, and bone meal.

In experiments with oats the addition of peat exerted no favorable effect upon the assimilation of the phosphates.

Field investigations for potash in America, H. S. GALE (*Amer. Fert.*, 37 (1912), No. 2, pp. 38-40).—A brief summary is given of the work undertaken and the results obtained by the United States Geological Survey in its search for potash supplies in this country.

Alunite as a source of potash, W. H. WAGHAMAN (U. S. Dept. Agr., *Bur. Soils Circ.* 70, pp. 4, figs. 2; *Orig. Commun. S. Internat. Cong. Appl. Chem.* [Washington and New York], 15 (1912), Sect. VII, pp. 375-379, figs. 2).—This circular describes the method and apparatus used to determine the temperature at which complete decomposition of alunite takes place. It was found that at a temperature of 700° C. alunite is completely decomposed, yielding a residue of potassium sulphate and alumina. The alunite used in these experiments contained 26.88 per cent of sulphur trioxid over and above that required to combine with the potash present. Only 23.05 per cent, however, was recovered on ignition, indicating a considerable loss as sulphur dioxide at the high temperature of ignition used. The ignited residue contained 15.95 per cent of potash and 15.37 per cent of sulphuric acid (SO_3). It is estimated that a ton (2,000 lbs.) of pure alunite will yield 220 lbs. of potash, 1,090 lbs. of sulphuric acid, and 740 lbs. of aluminum, worth in the aggregate \$13.88.

In view of the difficulty and expense of leaching potassium sulphate from the ignited material, it is thought to be "more practical to use the ignited alunite (free from soluble aluminum compounds) directly as a fertilizer either alone or in mixed goods, since the expense of separating the soluble salts from the alumina would probably more than counterbalance the value of the alumina obtained. The percentage of potash in the ignited residue is considerably greater than in kainit, our chief source of soluble potash."

The extraction of potash from silicate rocks, W. H. ROSS (U. S. Dept. Agr., *Bur. Soils Circ.* 71, pp. 10; *Amer. Fert.*, 37 (1912), No. 4, pp. 44-49).—This article describes and discusses the relative efficiency of various processes which have been proposed for this purpose. It is stated that "on account of its simplicity the method of decomposing feldspar by heating with calcium carbonate and with calcium chlorid (or sodium chlorid) could undoubtedly be carried out on a large scale without involving any serious mechanical difficulty, and the method would thus be a practical one providing the value of the products obtained would compensate for the expense involved," but the author is of the opinion "that any method to be economical must produce at the same time other products of value in addition to the potassium."

Action of magnesium [and manganese] fertilizers and of boric acid, P. ANDOUARD (*Engrais*, 27 (1912), No. 29, pp. 796-799).—Experiments on a variety of crops with a basic magnesium fertilizer with manganese (manganese carbonate) and with boric acid gave as a rule inconclusive results. The only fact which appeared to be definitely determined was that such fertilizers should not be applied broadcast, but should be thoroughly mixed with the soil.

Studies on catalytic fertilizers, E. BOULLANGER (*Ann. Sci. Agron.*, 4, ser. 1 (1912), 1, No. 3, pp. 161-180; *Ann. Inst. Pasteur*, 26 (1912), No. 6, pp. 456-466; *abs. in Internat. Inst. Agr. [Rome]*, *Bul. Bur. Agr. Intel. and Plant Diseases*, 3 (1912), No. 9, pp. 1955, 1956).—In pot experiments with manganese chlorid, alone and combined with other fertilizing materials, it was found that the use of the manganese fertilizer resulted in a marked increase in the yield of potatoes, but was practically without effect on barley. In similar experiments with so-called manganese and lime manganate, it was found that the manganese fertilizers increased the yield of oats, peas, and clover to a marked extent, particularly in the presence of potash salts and of a complete fertilizer containing potash.

Experiments are also reported in which manganese sulphate was compared with aluminum sulphate, sodium silicate, ferrous sulphate, uranium sulphate, and flowers of sulphur on a variety of vegetables. The effect of these substances was variable, but in the majority of cases the yield was increased. The action of flowers of sulphur was especially favorable.

On the basis of these experiments the author classifies the catalytic fertilizers as especially favorable to each crop as follows: Carrots, sulphur, aluminum sulphate, manganese sulphate, sodium silicate; beans, sulphur; celery, sulphur, ferrous sulphate, sodium silicate, manganese sulphate, aluminum sulphate; spinach, sulphur; lettuce, sulphur, manganese sulphate, ferrous sulphate, aluminum sulphate; sorrel, sulphur, manganese sulphate; chicory, sulphur, aluminum sulphate; potatoes, aluminum sulphate, sodium silicate, ferrous sulphate, sulphur; onions, aluminum sulphate, ferrous sulphate, and sulphur.

From experiments with sulphur on sterilized and unsterilized soil, the author concludes that the favorable action of sulphur is probably due to its influence in modifying the bacterial flora of the soil and hindering the growth of certain organisms.

The stimulating action of manganese, QUANTE (*Deut. Landw. Presse*, 39 (1912), No. 83, pp. 961, 962).—This article briefly reviews the work of several investigators on this subject, especially that of Boullanger noted above.

The author concludes that the experimental results show a marked benefit under certain conditions from the use of manganese compounds as fertilizer, but that some of the conclusions regarding the agricultural value of these compounds are too optimistic. Their actual agricultural value can be finally determined only by further practical trials under farm conditions.

Study of sulphur as a fertilizer, F. GIANNETTO (*Bol. Quind. Soc. Agr. Ital.*, 17 (1912), No. 14, pp. 425-429).—Experiments with sulphur alone and combined with different fertilizing materials on potatoes are reported, showing that sulphur applied alone at the rate of 400 lbs. per acre resulted in a net loss. When applied with other fertilizers, there was a decided net profit.

Utilizing sludge in Bradford, England (*Municipal Jour.*, 32 (1912), No. 19, pp. 703, 709).—Brief reference is made to profits obtained from sewage grease and sludge fertilizer, the plant for the preparation of which is being greatly extended.

City street sweepings as a fertilizer, J. J. SKINNER and J. H. BEATTIE (*U. S. Dept. Agr., Bur. Soils Circ.* 66, pp. 8, figs. 2; *Jour. Indus. and Engin. Chem.*, 4 (1912), No. 8, pp. 604-606, figs. 2).—This circular reports analyses and wire-basket tests on wheat, corn, and radishes of 3 samples of street sweepings, (1) the debris secured by hand sweeping with a brush, (2) that secured by sweeping with a machine, and (3) the decomposed material from a dump pile which had been accumulating for some time. The first contained 1.34 per cent nitrogen, 0.71 per cent potash, and 1.03 per cent phosphoric acid; the second, 0.86 per cent nitrogen, 0.55 per cent potash, and 0.55 per cent phosphoric acid; and the third, 1.60 per cent nitrogen, 0.56 per cent potash, and 0.60 per cent phosphoric acid.

In general, increased growth followed the use of all 3 materials, but the decomposed sweepings were least effective. The fertilizing effect of the sweepings was increased by extraction of the oil which they contained, and after such treatment they were practically as effective as stable manure. It appears, therefore, that oil is a deleterious constituent of the sweepings.

Review of progress in the fertilizer industry, 1909-1911, G. WICHEEN (*Chem. Ztg.*, 36 (1912), Nos. 37, pp. 329-331, figs. 3; 39, pp. 354, 355, figs. 2; 43, pp. 389-392, figs. 4; 46, pp. 420, 421, figs. 5; 47, pp. 434-436, figs. 5; 51, pp. 474, 475; 52, pp. 482-484).—This is a review of statistics of production and consumption of fertilizers in the principal countries of the world, of development of old and new sources of fertilizing materials, of methods of analysis, and of manufacturing processes and machinery.

(*Fertilizers*) (*Fla. Quart. Bul. Agr. Dept.*, 22 (1912), No. 2, pp. 159-169, 173-89).—This is a report on fertilizer inspection in Florida, with analyses of fertilizers examined to April 1, 1912.

AGRICULTURAL BOTANY.

A comparison of the alterations in the velocity of growth of certain seedlings through the action of rapid and slow electrons of the β -rays of radium, also a comparison of the rôle of chemical make-up and of physical factors in determining these alterations, E. D. CONEDON (*Arch. Entwickl. Mech. Organ.*, 34 (1912), pt. 2, pp. 267-280, figs. 2).—A study was made of the growth-retarding effects upon small seeds of the rapid and slow electrons of the β -radiations and also of the relative importance of physical factors and of chemical composition in determining the sensitiveness of seeds to exposures to radium. Five kinds of seeds were used, viz. black mustard, millet, poppy, Nicotiana, and Amaranthus.

It was found that by changing the penetrating power of the electrons their effect was greatly modified. The embryos of mustard and millet were chiefly affected, from which it is inferred that the embryo appeared more sensitive than the stored foodstuff. It is thought probable that in the embryo there was some injury of ferments or some unfavorable change of the general conditions of solution rather than the breaking down of certain compounds which retarded the growth.

The slower electrons of the β -radiations were found to have a greater retarding action than the more rapid ones in proportion to their ionizing power, and in proportion to their energy content on the small seeds used in the experiments except when the embryo was protected by being turned away from the radium. The retardative effect relative to the duration of exposure increased with the lengthening of the exposure, then decreased, and finally became constant with a slow increase of retardation. Very short irradiation in the case of mustard and millet seed left doubt as to whether acceleration occurred or not. By comparing the retardation of mustard and millet when the embryo was turned toward and away from the radium it was found that this part of the seed was especially sensitive to the electrons.

Dry matter, nitrogen, and mineral content of trees during the vegetative period, E. RAMANN and H. BAUER (*Jahrb. Wiss. Bot. [Pringsheim]*, 50 (1911), No. 1, pp. 67-83; *abs. in Bot. Centbl.*, 119 (1912), No. 20, pp. 491, 492).—Investigations with young trees of various common species led to the following conclusions:

The new growth of foliage trees in the spring takes place chiefly by the expenditure of materials previously stored, which are often broken down and utilized in large quantities in such trees. Conifers utilize in addition newly assimilated materials, different species drawing on the soil supply during different periods. For example, nitrogen assimilation by fir trees takes place most actively during the period from September until about May 15; by pine trees from that time until July 15; and by Scotch fir and larch trees thereafter until September 15. The relations of the phosphorus compounds are about the same. These facts suggest the cultivation of a mixed stand for the best utilization of the abundant materials in a rich soil. See also previous notes (E. S. B., 25, p. 27; 27, p. 229).

The mineral content of tree foliage as affected by day and night, E. RAMANN (*Jahrb. Wiss. Bot. [Pringsheim]*, 50 (1911), No. 1, pp. 84-91; *abs. in Bot. Centbl.*, 119 (1912), No. 20, p. 491).—Analyses made, in pursuance of previous studies (see above), of leaves of beech, oak, hazel, plane tree, maple, etc., indicate that while other minerals do not show any considerable difference for day and night, the calcium content (as computed on the basis of the dry substance) increases at night and decreases by day. A possible connection is suggested between the relative quantity of this mineral present and the trans-

portation or assimilation products, which is said to be more active during the hours of daylight.

Changes in the osmotic pressure of the sap of the leaves of various plants, H. H. DEXON and W. R. G. ATKINS (*Sci. Proc. Roy. Dublin Soc., n. ser., 13* (1912), Nov. 16, pp. 219-222; 18, pp. 229-238, figs. 2; 19, pp. 239-246, fig. 1).—Investigations have been made on the changes in the osmotic pressure of the sap of the leaves, the method employed being that described elsewhere (*El. S. R., 23, p. 526*).

Experiments with *Syringa vulgaris* were carried on to trace the changes in the osmotic pressure during the unfolding of the buds and the maturing of the leaves. It was found that the osmotic pressure of the sap of the buds rose from February to March, and this is attributed to the transportation of dissolved substances into the buds and to the solution of previously undissolved bodies in them. In April the rapid increase in size of the leaves was associated with a dilution of the sap, indicating that during this period the absorption of water predominated over the accumulation of dissolved substances. From that time on, as the leaves grew and matured, the pressure continued to rise until June, when the observations were brought to a close. Previous observations, however, indicate that the pressure continues to rise in the leaves during the summer. After the final rise of osmotic pressure in the late summer a diminution is registered in the sap from the leaves just about to fall. This is attributed to the transportation of materials from the leaves.

In the second and third papers the materials selected for investigation were the leaves of evergreen plants. In *Ilex aquifolium* there was not only a difference observable between the mature and immature leaves in their osmotic pressure, but also between mature leaves of various ages.

With *Hedera helix* the effect of direct sunlight on osmotic pressure was investigated, and with this plant it was also found that the age of the leaves had a marked influence on the concentration of the cell sap. Leaves of the ivy which were grown in a southern aspect had a consistently higher cryoscopic value than those of leaves grown in a northern aspect. This confirms other observations which showed that the depression of freezing point of the sap of the aerial portions of plants was greater in plants grown in a sunny position than in those grown in more shaded situations. In *Hedera* as in *Ilex* the depressions in the curve seemed to correspond to periods of elongation of the shoots and the formation of new leaves, and it was found impossible to correlate the form of the curves closely with external conditions. The effect of photosynthesis on variation in osmotic pressure was investigated, and the results indicate that photosynthesis is active in raising the concentration.

The formation of mechanical tissue as influenced by tension and contact, W. D. BRUSH (*Bot. Gaz., 59* (1912), No. 6, pp. 453-477, figs. 3).—Studies are reported on the formation of mechanical tissue in the tendrils of *Passiflora coerulea* as influenced by tension and contact. The experiments were conducted in the greenhouse under control conditions and the results are given in detail.

It was found that the tendrils which function to support the plant possess a greater breaking strength than those which have grasped no support. The cause of this greatly increased strength is attributed to a combination of the two factors contact and tension. Comparing the values of these two factors, the author concludes that contact plays the more important part, though the strength of the tendril may be still more increased by the factor of tension. The author claims that tension may also act as a stimulus and thereby result in the production of stronger tissues in the plant. It is thought probable that this increased growth is due to increased hydrostatic pressure.

A bibliography is appended.

The admission of anilin colors into living plant cells, R. KÜSTER (*Jahrb. Wiss. Bot. [Pringsheim]*, 56 (1911), No. 3, pp. 261-288; *abstr. in Bot. Gentol.*, 119 (1912), No. 20, pp. 488, 489; *Ztschr. Bot.*, 4 (1912), No. 6, p. 450).—The author reports as the results of his experiments that various anilin solutions are taken up by living parenchyma cells near the vascular bundles and stored and strongly held by such cells, this being conspicuously true in case of epidermal cells of leaves and flowers. The cells in question exhibited a selective power when provided with different colored solutions. The coloring matter once admitted is not washed out if immersed for some time in standing or running water. Thus, several acid coloring matters have now a claim to be considered as vitally colorative, a character heretofore generally considered to be limited to basic colors. Only a very few colloidal substances are found to possess this ability. Transpiration favors greatly the entrance of coloring matters into the cells.

The significance of respiration pigments in the oxidation processes of plants, W. PALLADIN (*Ztschr. Gärungsphysiol.*, 1 (1912), No. 2, pp. 91-105).—Continuing previous work (E. S. R., 27, p. 426), the author gives the final results of his studies on the relation of respiration pigments to oxidation processes, in substance as follows:

The rôle of these pigments in the oxidation processes consists in the withdrawal of hydrogen from the oxidizing substance. The oxidases appears as ferments, building both water and pigment. During respiration the entire hydrogen of the glucose, which is anaerobically broken up, is oxidized to water. The oxidation of glucose by the aid of a respiratory pigment occurs with the participation of water. Such oxidation occurs partly by use of the oxygen in the glucose, partly by employment of that in the water assimilated, water being both produced and assimilated during this process. The respiration pigments are held to be necessary to the intracellular respiration and to the oxidation of the hydrogen. The chemical reactions held to support these statements are given in some detail.

Distribution of pigment in the seed coat of the cowpea, A. MANN (*Abstr. in Science*, n. ser., 35 (1912), No. 913, p. 1004).—A study of the seed coat of the cowpea showed that it is composed of 3 principal layers of cells, an outer palisade layer, a heavy-walled layer of empty cells below this, and a layer of considerably compressed cells with a long axis parallel to the surface of the cowpea.

It was found that the colorations in the cowpea are the result of pigments deposited in 2 of these layers. In all colored cowpeas there is in the lowest layer a basal color or practically uniform tint, which is a melanin compound of an orange-yellow tint, grading into lemon yellow and pale buff. All the other colors are obtained by superposing upon this basal color layer various pigments, and these are uniformly deposited in the palisade cells. The 3 colors found in the palisade cells are black or blue-black, sometimes purple, which is an anthocyanin, a yellow or a brown pigment, and an intensely black pigment, the last 2 being melanin compounds. By various arrangements of these superposed tints, or by the absence of any pigments in these cells, the various schemes of coloration in the cowpea are obtained.

In the case of cowpeas having white or colorless seed coats, the result, it is stated, is obtained by the suppression of all pigments, both in the basal color layer and in the palisade color layer.

A wild cowpea secured from Africa showed the same elements of color as well as the schemes of coloration.

The distribution of oxidases in plants and their rôle in the formation of pigments, F. KEEBLER and E. F. ARMSTRONG (*Proc. Roy. Soc. [London]*, Ser. B,

14 (1913), No. 2, 273, pp. 214-218).—Studies were made of the distribution of oxidases in connection with the formation of pigments in the Chinese primrose (*Primula sinensis*).

The distribution of pigment in the flower was found to coincide with that of peroxidases, two of which were found in the primrose, one occurring in the epidermis and in some cases in the layers subjacent to the epidermis, while the other was localized in layers of cells neighboring the woody tissues of the vascular bundles. The epidermal and bundle peroxidases were found to differ from one another both in their distribution and in their color reactions. Certain varieties of the Chinese primrose give under certain circumstances a direct oxidase reaction. The bundle peroxidase of the petals of the flower is located in the cells of the bundle sheath which surrounds the veins.

White flowers which are known to be dominant whites are said to fail to give the epidermal peroxidase reaction, but in such flowers a faint bundle peroxidase reaction may occur. Both epidermal and bundle peroxidases are, however, present in dominant white flowers, the white primulas containing a substance which inhibits but does not destroy the pigment-producing peroxidase.

Observations made on the epidermal and bundle peroxidases are believed to throw light on the significance of sporting in cultivated flowers, the authors being inclined to regard flaking as the effect of the bundle peroxidase on the chromogen-containing cells neighboring on the bundle sheath. The white color is attributed to an inhibitor associated with and nullifying the epidermal peroxidase. The marked localization of pigmentation effected by bundle peroxidase appears to be due to anatomical causes, such as the degree of development of the cells and the nearness of the veins to one another.

The existence of two localized peroxidases which may induce pigmentation and may reinforce one another along certain tracts of tissue is held to provide material facts for the explanation of color range and color pattern in flowers.

The occurrence of urease in higher plants, G. ZEMPLÉN (*Hoppe-Seyler's Nachr. Physiol. Chem.*, 79 (1912), No. 3, pp. 229-234; *abs. in Jour. Chem. Soc. London*), 102 (1912), No. 597, II, p. 674).—In a series of investigations to ascertain the presence and proportion of urease in certain agricultural plants, the author found it in a large number of the Papilionaceae, different species of which contain this enzyme in widely varying percentages, while in the Gramineae it was present, if at all, in quantities scarcely demonstrable in most cases. Tabulated details are given and an early discussion is promised.

The action of bisulphid of carbon on the germination of seeds, B. FINZI (*Staz. Sper. Agr. Ital.*, 44 (1911), No. 11-12, pp. 843-848).—A preliminary note by the author on his experiments shows that exposure to carbon bisulphid vapor during periods varying from 30 minutes to 48 hours accelerated the germination of seeds of *Ziziphus cylindrica*, *Bromus erectus*, *Trigonella fenum-graecum*, *Ononis asclepiadifolia*, *Canna cupheana*, and *C. orientalis*. The seeds of 8 other species either showed little or no acceleration or appeared to be retarded.

Nutritive changes in sprouting pumpkin seeds, F. T. PERITURIN (*Izv. Vses. Nauch. Khim. Inst. (Ann. Inst. Agron. Moscow)*, 18 (1912), No. 2, pp. 22-25).—The pumpkin seeds experimented upon were divided into 4 lots and treated in water and in solutions of ammonium chlorid, ammonium chlorid in calcium carbonate, and ammonium chlorid with calcium sulphate. After 1 day the seedlings were analyzed and the fat and nitrogen contents ascertained. The results are given in tabular form. It appears therefrom that isolated seedlings take up ammonia not as such but as asparagin, the larger salts being obtained when the calcium salts were employed with ammonium in the nutritive solutions.

The formation of asparagin in sprouting vetches, S. I. RITMAN (*Izv. Moskov. Sel'sk. Khoz. Inst. (Ann. Inst. Agron. Moscow)*, 18 (1912), No. 2, pp. 212-220).—From studies of young seedlings of *Vicia sativa*, nourished with ammonia and nitrates, the author concludes that almost all the nitrogen assimilated by the roots in darkness goes into the formation of asparagin.

Protein formation by sterile cultures of higher plants in darkness, I. SHULOV (*Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.)*, 13 (1912), No. 2, 207-210).—Investigations carried out with sterile cultures of maize in darkness, supplied with a prepared carbohydrate (saccharose), are said to have shown the following results: Assimilation of the nitrogen-free organic material, the depressing effect of ammonium sulphate on plant development, the decrease of such unfavorable influence by employment of ammonium nitrate, a considerable increase of proteins, and confirmation of the practicability and reliability of the methods here employed.

The utilization of ammoniacal nitrogen by corn plantlets, S. I. KALININ (*Izv. Moskov. Sel'sk. Khoz. Inst. (Ann. Inst. Agron. Moscow)*, 18 (1912), No. 1, pp. 180-192).—The author experimented with 4 different lots of young maize plants kept in darkness for 10 days and supplied, respectively, with (1) water, (2) a 0.075 per cent solution of ammonium chlorid, (3) the same percentage of the chlorid plus calcium carbonate, and (4) of the chlorid with calcium sulphate.

The results showed that the nitrogen of the ammoniacal salt is utilized by the plant in the construction of protein, either directly or through the formation of asparagin. The results, in general, agree with those obtained by Prianišnikov and Shulov with peas (*E. S. R.*, 24, p. 629), Godlewski with grains (*E. S. R.*, 26, p. 625), and of Ritman with vetches and Periturin with pumpkin seeds, noted above.

Further experiments on the utilization of ammonium salts by green plants, E. PANTANELLI and G. SEVERINI (*Staz. Sper. Agr. Ital.*, 44 (1911), No. 11-12, pp. 873-908).—Continuing previous work (*E. S. R.*, 25, p. 228), the authors find that ammoniacal nitrogen has a potential nutritive value for plants superior to that of nitrates, but the full expression of that higher value is conditioned upon (1) slow absorption of the ammonium cation by the roots, (2) about equal absorption of the corresponding anion, and (3) the possession of a nutritive value by the anion itself.

The presence of nitrifying bacteria in ordinary sand cultures, I. SHULOV (*Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.)*, 13 (1912), No. 2, pp. 214-215).—By introducing into the substratum for nitrifying bacteria sand from ordinary cultures, the author was able to show that these bacteria may be present in such cultures and that the process of nitrification may occur therein. Notable losses of ammonia gas were observed by this investigator, as previously by H. Astafjew, and attributed to the action of magnesium carbonate and ammonium sulphate.

On the presence of glutamic acid in the tomato, N. MONRI (*Staz. Sper. Agr. Ital.*, 44 (1911), No. 11-12, pp. 813-823).—The author claims to have demonstrated the presence of this acid in the sap of tomatoes, but has been unable to determine its origin.

On anthocyanin-forming bodies, J. POLITIS (*Atti R. Accad. Lincei, Rend. Sci. Fis., Mat. e Nat.*, 5. ser., 20 (1911), I, No. 11, pp. 828-834; obs. in *Rend. Centrl.*, 119 (1912), No. 21, p. 524).—After a brief discussion of the mechanism of anthocyanin formation, the author gives an account of his investigations with flowers of *Billbergia nutans*, *Iris Ambriata*, *Lalia anceps*, *Aquilegia vulgaris*, *Erica carnea*, *Nepeta glechoma*, *Clerodendron balfourii*, *Weigela japonica*, *W. rosea*, and on fruits of *Convallaria japonica*.

It is concluded that anthocyanin is not formed from substances in the cell sap, but is the product of special organs termed cyanoplastids. These originate from the protoplasm as a new product, being made up largely of tannin-like substance inclosed in an envelope of unknown chemical composition, both envelope and contents, however, being able to become sources of anthocyanin. Certain external agencies seem able to hinder or prevent a transformation of the cyanoplastid material into anthocyanin, this body remaining colorless. Each cyanoplastid seems to pass through a determinate cycle of development. When degeneration begins, the pigment formed therein is given up to the cell sap. Different kinds of anthocyanin are found, giving various colors, which do not depend upon the acidity of the cell sap to color a given pigment differently.

On the presence of free hydrocyanic acid in plants, II, C. RAVENNA and I. BABINI (*Atti R. Accad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat.*, 5. ser., 21 (1912), I. No. 8, pp. 540-544).—By methods previously described (E. S. R., 24, p. 228), the authors have made a study of the leaves of cherry laurel, peach, orghum, flax, and medlar, and have found that free hydrocyanic acid occurs in appreciable quantity in all of them.

The selective power of plants for dextrose and levulose, L. LINDET (*Ann. Nat. Agron.*, 2. ser., 10 (1911), No. 1, pp. 49-68; abs. in *Bot. Centbl.*, 119 (1912), No. 20, pp. 489, 490).—This article has been previously noted from other sources (E. S. R., 25, p. 522).

Potassium in relation to carbohydrate formation and decomposition, STOKLASA (*Ztschr. Landw. Versuchs. Österr.*, 15 (1912), No. 6, pp. 711-76).—In pursuance of previous studies, noted elsewhere (E. S. R., 25, p. 522; & p. 226), on the physiological influences of certain metals, the author experimented with the action of potassium on cells of several plants. He concluded that potassium is generally indispensable to the building of carbohydrates, as well as for their physiological combustion, also in the metabolic processes occurring both in cells which lack and those which possess chlorophyll.

The action of sulphurous acid on pollen, V. SABACHNIKOFF (*Compt. Rend. c. Biol. [Paris]*, 72 (1912), No. 5, pp. 191-193; abs. in *Internat. Inst. Agr. Rome, Bul. Bur. Agr. Intel. and Plant Diseases*, 3 (1912), No. 4, pp. 1049, 50).—The author reports that in an atmosphere saturated with sulphurous acid, pollen of the following plants was killed by an exposure of from 3 to 5 hours: *Heliothis viridis*, *H. orientalis*, *Hepatica triloba* (*Anemone hepatica*), *Plantago media*, *Primula officinalis*, *Vinca minor*, *V. major*, *Convallaria majalis*, *Narcissus poeticus*, *Callitha palustris*, *Cytisus laburnum*, *Viola tricolor*, *Viola maculata*, *Billbergia*, *Eranthis*, and *Crocus*.

Very small proportions of sulphurous acid (between 1:1,000 and 1:30,000 in exposures from 3 to 48 hours) do not as a rule kill the pollen or destroy its germinating power, but the pollen tube grows abnormally, usually remaining short, and taking an irregular form. This is said to have been noted in the case of *A. hepatica*, *Billbergia*, *H. orientalis*, *Vinca minor*, *Viola tricolor*, *P. media*, *Lilium candidum*, *Petunia*, and *Pisum*. The germinating property of pollen remained unimpaired after exposure of from 1 to 48 hours to sulphurous acid with a concentration of 1:48,000, but this property was usually destroyed by a 3-hours' exposure to the concentration of 1:13,000, which conditions of exposure may be considered as about the limits of safety for these plants.

Injury to plants by vapors and dust from tarred roads, C. L. GATIN (*Zeitschr. Pflanzenkrankh.*, 22 (1912), No. 4, pp. 193-204).—This is a further report of the author's investigations (E. S. R., 27, p. 333), stating that both laboratory and garden studies support the conclusions that coal tar and its dusts carried by air and dust to foliage are injurious to the plants; that such

injury does not always become apparent at first, in some cases not within 2 years; and that sunlight favors the injurious action of the tar products in certain cases.

A bibliography is appended.

A study on the influence of starvation of the ascendants upon the characteristics of the descendants, I, J. A. HARRIS (*Amer. Nat.*, 46 (1912), No. 546, pp. 515-543, figs. 7).—The author presents his first report on a study of 5 series of garden beans, giving a statement of the problem and a description of the methods, the work having been carried on for some time and involving about 21,000 individuals.

The purpose of the investigation was to ascertain whether the artificial depauperization of the ancestors has any influence upon the characters of the offspring. Beans were planted in ordinary fertile and sterile soils or good and poor agricultural land, and the influence of from one to three generations was studied. Thus far, it is stated, hardly any difference can be detected by the eye in the field, but the statistical constants seem to show a slight influence of the treatment of the ancestors in the form of a slight decrease in the number of pods per plant.

The data are as yet insufficient to justify any discussion of the question of the cumulative influence of the starvation conditions or of the mechanism through which the characters of the plants are modified.

Chromosome numbers in *Triticum* and *Aegilops*, W. BALLY (*Ber. Deutsch. Bot. Gesell.*, 30 (1912), No. 4, pp. 163-172, pl. 1).—This is a cytological contribution to the study of relation among the wheats, based upon a study of the chromosome numbers. It is stated that (1) *Triticum dicoccoides* has 8 simple chromosomes, in this respect resembling *T. vulgare* and *Secale cereale*, and (2) *Aegilops ovata*, which is able to hybridize with species of *Triticum*, has 16 simple chromosomes.

A bibliography is appended.

Soil moisture in the cottonwood dune association of Lake Michigan, G. D. FULLER (*Bot. Gaz.*, 53 (1912), No. 6, pp. 512-514, fig. 1).—The author records data regarding the range of soil moisture in the cottonwood dune association upon the shores of Lake Michigan. This area is considered an open association of a single tree species, together with a scanty undergrowth of shrubs and grasses, developing upon more or less rapidly moving dunes, possessing a high rate of evaporation and exhibiting many strongly xerophytic characters. The almost complete absence of herbaceous undergrowth and the expanse of bare sand give it a desert-like aspect; but below the superficial layer of sand an abundant and unfailing water supply has been found.

The wilting coefficient of the dune soil was determined by the method of Briggs and Shantz (*E. S. R.*, 26, p. 628) to be 0.75 per cent. Throughout the most arid portion of the season the surplus of growth water was found to average 2.2 per cent, showing that, considered upon the basis of its soil moisture, the association is decidedly mesophytic. The causes of the xerophytic character of the vegetation are believed to be the high evaporating power of the air and the instability of the substratum.

From the data obtained the author believes that the determination of soil moisture, related to plant growth through the wilting coefficients of the soil, will afford an efficient means of making quantitative studies of the water supplies of the subterranean parts of plant associations, and enable students of ecology to analyze more closely the effects of various factors influencing the production of any particular plant association.

A comparison of the rates of evaporation in certain associations in central Illinois, H. A. GLEASON and F. C. GATES (*Bot. Gaz.*, 53 (1912), No. 6, pp. 476-

U. S. Rpt. 1.—An account is given of a series of measurements of the relative rates of evaporation in certain plant associations made during June and July, 1910. The authors used porous clay atmometers for determining the differences in evaporation, and it was found that the differences in the various associations are due chiefly to the nature of the vegetation, which by its size and density controls the evaporation beneath it. It is claimed that successions between associations are not caused by any conditions of evaporation, and that the more primitive associations have the higher rates of evaporation, while those most nearly like the climax type have the lowest rates. This is held to be true not only for forest associations but also for prairie associations, which are correlated with an arid climate and consequently high climatic evaporation.

Seeds and plants imported during the period from July 1 to September 30, 1911—Inventory No. 28 (U. S. Dept. Agr., Bur. Plant Indus. Bul. 248, pp. 71).—This gives a list with descriptive notes of seeds and plants imported during the period mentioned, more than 500 items being included. A large portion of the material was obtained by Mr. F. N. Meyer in Chinese Turkestan, and the balance from miscellaneous sources.

FIELD CROPS.

Results obtained in 1911 on the Dominion experimental farms from trial plots of grain, fodder corn, field roots, and potatoes, C. E. SAUNDERS (*Canada Cent. Expt. Farm Bul. 71, 1911, pp. 74*).—Results of a large number of experiments conducted at the experimental farms during the season of 1911 with important varieties of wheat, oats, barley, peas, corn, turnips, mangels, carrots, sugar beets, and potatoes are presented. The results show marked differences in earliness and in the relative productiveness of varieties even when grown under similar conditions. Lists of recommended varieties of the different crops suitable for the different provinces or districts are given. The publication of data as to the average yields obtained during a series of years, as noted in previous bulletins (E. S. R., 24, p. 435), has been discontinued.

Second report on experiments, botanical experiment station, Salisbury, 1910-11, J. H. HAMPTON (*Rhodesia Agr. Jour.*, 8 (1911), No. 6, pp. 853-862; 9 (1911), No. 1, pp. 16-23, pls. 4).—Moderately satisfactory results were obtained with dry-land alfalfa. Egyptian clover, velvet beans, cowpeas, lupines, ground nuts, sweet potatoes, wheat, oats, Teff grass (*Eragrostis abyssinica*), teosinte, sugar cane, and various millets were tested for summer forage. Velvet beans yielded 3,080 lbs. of cured hay per acre and proved more satisfactory than cowpeas. Only the Black-eyed Susan and Iron cowpeas gave satisfactory results. American peanuts and sweet potatoes proved superior to the native varieties. Other crops discussed are flax, mangels, sugar beets, swedes, kohlrabi, carrots, rape, beans, and peas.

Annual report of the experimental work of the Bankipore Agricultural Station, 1910-11 (*Ann. Rpt. Bankipore Agr. Sta. [Bengal], 1910-11, pp. 10*).—Two rice seedlings per hole gave greater yields of grain and straw than plantings of 1, 4, or 8 seedlings per hole. Green manuring with sann hemp was followed by somewhat greater yields of rice and straw than green manuring with *chamcha*, and both by much greater yields than from the unmanured plots. Other work reported includes variety and fertilizer tests with rice and a fertilizer test with sugar cane.

Annual report of the Cuttack Experimental Farm, 1910-11, A. C. DOBBS (*Ann. Rpt. Cuttack Agr. Sta. [Bengal], 1910-11, pp. 11*).—Transplanting rice at the rate of 1 seedling per hole gave a greater 5 years' average yield than transplanting at the rate of 2, 3, or 4 seedlings. Other work reported includes

variety, fertilizer, rate of seeding, and irrigation tests with rice, a comparison of broadcasting and transplanting rice, and a fertilizer test with sugar cane.

Annual report of the agricultural stations in Eastern Bengal and Assam for the year ending June 30, 1911 (*Ann. Rpt. Agr. Stas. East. Bengal and Assam, 1911*, pp. 11+99, pls. 3).—Previous work has already been noted (*E. S. R.*, 26, p. 233).

Work with rice, sugar cane, cotton, soy beans, and fodder crops is reported for the Dacca station, with tobacco, oats, mustard, wheat, potatoes, peanuts, green manure, and fodder crops at the Burirhat station, with rice and sugar cane at the Rajshahi station, with sugar cane, peanuts, potatoes, and the application of lime at the Jorhat station, with fruit and garden crops at the Shillong fruit station, and with potatoes, oats, flax, soy beans, ensilage, and fodder at the Upper Shillong station. A brief progress report of work at the Wahjain station is also given.

At the Jorhat station the Striped Mauritius sugar cane stood first in total yield of sugar, followed by B 376 and B 147. These 3 varieties were also superior to the others in quality of juice. At the Upper Shillong station it proved better to plant whole potatoes than to cut them in case of what the author terms summer seed, but the cut sets produced the highest yields in case of winter seed.

Annual report of the demonstration farm, St. Andrew's Colonial Homes, Kalimpong, for the year 1910-11, P. W. GOODWIN (*Ann. Rpt. Kalimpong Demon. Farm, Bengal, 1910-11*, pp. 11+40).—A report of fertilizer, variety, and other tests of corn, rice, jute, buckwheat, barley, spelt, oats, soy beans, and other crops.

Field crops at the Taganrog Experiment Field during 1899-1908, N. OLKIN (*Khoziaistvo, 1911*, No. 6-7; *abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.)*, 12 (1911), No. 4, pp. 572, 573).—This is an account of the first 10 years' work on these fields. Early green fallow appeared preferable to all other kinds. Fall plowing $5\frac{1}{2}$ in. deep gave better results than either more shallow or deeper plowing, but in the spring $3\frac{1}{2}$ in. appeared to be the best depth.

Moor culture handbook, W. BERSCH (*Handbuch der Moorkultur. Vienna and Leipzig, 1909*, pp. XII+288, pls. 8, figs. 41).—This manual of information is divided into 10 chapters, dealing with the historical, scientific, soil, cultural, forestry, weed control, and economic phases of the subject.

Manuring of meadow land (*Rpt. Dir. Agr. Ed., Monmouthshire Bd. Com., 1911*, Oct. 18; *abs. in Jour. Bd. Agr. [London]*, 18 (1912), No. 11, p. 941).—This is a report of fertilizer tests on 3 different soils since 1909.

Manuring of poor hill pastures (*Rpt. Agr. Instr. Com. Somerset County Council, 1911*; *abs. in Jour. Bd. Agr. [London]*, 18 (1912), No. 11, p. 941).—This is a report of tests of basic slag, superphosphate, lime, and kainit at 4 points in Somerset. Slag and superphosphate apparently produced a marked improvement, but little or no result followed the use of ground lime or of kainit.

The grain crops, J. F. HOFFMANN (*Das Getreidekorn. Berlin, 1912*, vol. 1, pp. VII+249, figs. 77).—In the 5 parts into which this work is divided, the author considers the general and botanical characters of the grain crops, with special reference to their production and diseases. Fungus and insect enemies and the insects injurious to stored grains are also treated. In the chapter dealing with the botanical and cultural phases of the subject, separate discussions deal with rye, wheat, barley, oats, rice, corn, beans, and buckwheat.

Rate of sowing summer cereals, A. DANILEWKO (*Izgo Vost. Khoz. 1910*, No. 42; *abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.)*, 12 (1911), No. 9, pp. 581, 582).—This article reports the results of tests of rates of sowing swedes, oats, and barley in rows at the Don Experiment Field.

grain sowing in wide rows, A. DANILENKO (*Iugo Vost. Khoz.* 1910, No. 42; abs. in *Zhur. Opytn. Agron.* (Russ. Jour. Expt. Landw.), 12 (1911), No. 4, p. 431).—In 1910 at the Don Experiment Field the usual continuous sowing in rows was compared with sowing in single and double rows 14 in. or less apart with wheat, oats, barley, and millet. Sowing in wide rows apparently decreased the yield of wheat, but increased the yields of oats, millet, and barley, except in the case of the double rows, to an extent sufficient to make sowing in wide rows profitable.

The composition of Cape barley, C. F. JURITZ (*Agr. Jour. Union So. Africa*, 8 (1912), No. 4, pp. 516-529).—Tables report analyses of 47 samples of barley, and the location, character, cultural treatment, and fertilization of the soil upon which each was grown.

The dissemination of brewing barley in Germany, H. SCHULZE (*Wchnschr. Brau.* 28 (1911), Nos. 32, pp. 350-356; 33, pp. 367-371; 34, pp. 382-385; 35, pp. 397-400, fig. 1).—This article presents the information obtained in an investigation of the present geographical distribution of brewing barley varieties in Germany, and suggests varieties that are likely to come into general use in certain sections.

Bogoroditsch Experiment Field, I. A. PULMAN (*Ezheg. Dept. Zeml. [Russia]*, 1908, pp. 51-77, pls. 10; abs. in *Zhur. Opytn. Agron.* (Russ. Jour. Expt. Landw.), 12 (1911), No. 4, pp. 582-584).—Meteorological data and descriptions of the soils of the Bogoroditsch Experiment Field in Staros-Kalsk County in the Kursk government accompany a statement of the results of 8 years' experimental work dealing largely with buckwheat. The observations reported deal with the effect of rate of planting, soil moisture, and the amount and distribution of sunshine during the season on the structure and development of the buckwheat plant. Work is also being done on the production of a 4-faced strain or variety which is more resistant to early spring frosts and produces heavier seeds.

The manuring of carrots, E. E. STOKES (*Midland Agr. and Dairy Col. B. L.* 4, 1911-12, pp. 39-44).—The author concludes that the soil usually planted to carrots should receive salt, especially during a hot, dry season, that potash in some form is absolutely necessary, and that phosphates stand next in order of importance.

Manurial experiments on maize, H. J. VIPOND (*Agr. Jour. Union So. Africa*, 8 (1911), No. 5, pp. 618-623).—In a test of 13 applications of lime, phosphate, slag, bone meal, sulphate of potash, and nitrate of soda, singly or in various mixtures and amounts, the highest corn yields followed the use of 400 lbs. of bone meal and 400 lbs. of basic slag. Analyses of 20 Transvaal soils are given.

Corn growing in the East, T. F. HUNT (*Pennsylvania Sta. Bul.* 116, pp. 16, figs. 5).—After a study of the acreage devoted to each of a number of crops in the North Atlantic States, the author concludes "that the composite eastern farmer has a 7 years' rotation in which an intertilled crop, a spring grain, and a winter grain each occupy 1 year, while hay occupies 4 years." Based on results secured by the station and previously noted (*E. S. R.*, 3, p. 713; 26, p. 177), the following rotations are suggested: (1) Corn, wheat, clover and timothy; (2) corn, oats, wheat, clover and timothy; (3) corn, oats, wheat, clover and timothy, timothy; and (4) 2 years in corn, one each in oats, wheat, and clover and timothy, and 2 in timothy.

Portions of letters from experiment-station workers in the North Atlantic States are reprinted and photographs illustrate sample ears submitted in response to a request for samples of varieties worthy of special mention. In early every instance 2 types were recommended, an 8-rowed flint, and a

medium-sized dent to which the name Pride of the North was usually given. The only exceptions to this rule were the southern portions of New Jersey and Pennsylvania, and the more northern portions of the New England States.

How to grow one hundred bushels of corn per acre on worn soils, W. C. SMITH (*Cincinnati*, 1912, 2. ed., rev. and enl., pp. 188, pls. 24).—This handbook of information for corn growers is written with special reference to the restoration of worn-out soil for corn production.

Observations on certain extra Indian Asiatic cottons, H. M. LEAKE and R. PERSHAD (*Mem. Dept. Agr. India, Bot. Ser.*, 4 (1912), No. 5, pp. 93-114, pls. 7).—Botanical and other information on the cottons of Persia, China, and Siam.

The branching habits of Egyptian cotton, A. McLACHLAN (*U. S. Dept. Agr., Bur. Plant Indus. Bul.* 249, pp. 28, pls. 3, fig. 1).—This bulletin presents results of a study of the branching habits of Egyptian cotton conducted for the purpose of developing a system of cultivation adapted to the irrigated districts of southern California and Arizona. By means of especially devised diagrams for recording the branching habits of the plant, the location of branches, the development of fruiting branches, and the stature of plants are illustrated.

It is pointed out that the Egyptian cotton plant bears 2 kinds of branches, long vegetative branches on the lower part of the stem bearing no flower buds directly, and above these shorter fruiting branches, which bear flower buds. The vegetative branches usually approximate the length of the main stem, bear no flower buds except as they produce secondary fruiting branches, and, like the axis, bear fruiting branches and may bear vegetative branches. The fruiting branches, on the other hand, are about only one-third as long as the vegetative branches, bear a flower bud at each node opposite the leaf, and rarely bear fruiting branches or vegetative branches. It is stated that from 6 to 8 large vegetative branches are usually produced from the first 10 nodes of the axis, and that at the next 2 or 3 nodes the buds frequently remain dormant or are abortive, while above these a fruiting branch is produced at each node.

The length and number of vegetative branches largely determine the stature of the plant, and their control is necessary because of the desirability of small plants in cultivating and harvesting. As a means of restricting the development of branches early planting is advised.

Abortion of early fruiting branches on both axis and large limbs was common in a greater or less degree to all stocks grown from imported seed. It has been found that the Arizona acclimatized plants frequently abort their lowest fruiting branches. Some of the selected acclimatized types of Egyptian cotton, originated in the United States, bear fruiting branches at lower nodes on the stem than the imported stocks. Of the 6 Egyptian varieties grown in Arizona in 1909 from imported seed, Nubari most nearly resembled the acclimatized stocks in putting out fruiting branches at comparatively low nodes. Topping young plants resulted in stimulating the growth of buds in the axils of cotyledons. Branches just below the point where the plant was topped make an excessive vegetative growth and tend to assume an upright position in place of the severed axis. Egyptian cotton plants grown on soil containing considerable alkali restrict the development of limbs and reject their early fruiting branches.

Cotton improvement under weevil conditions, O. F. COOK (*U. S. Dept. Agr., Farmers' Bul.* 501, pp. 22).—This publication discusses various factors in their bearing upon the profitable and progressive culture of cotton under weevil conditions, special attention being given to earliness in the variety and cultural methods. It is pointed out that "the general object of all measures of controlling or resisting the boll weevil is to shorten the period between the formation of flower buds and the growth of the bolls beyond the danger of weevil

While earliness becomes a more important factor than before there is nothing to indicate that superior varieties are likely to be excluded from cultivation in any section that continues to grow cotton in the presence of weeds. Many advantages can be gained if the cotton growers of each community would unite in the choice of a variety and the date of planting and would follow the same methods of cultivation, selection, ginning, and marketing the crop.

The influence of Russian weather conditions in 1902 on oats, K. MIKHAILOVSKI (*Trudy Sel'sk. Khoz. Met.*, 1910, No. 6, pp. 1-20; *abs. in Zhur. Opytn. Agron. (Russ. Jour. Expt. Landw.)*, 12 (1911), No. 6, pp. 925, 926).—After drought and excessive heat, 35 per cent of the oat heads were imperfectly developed or contained no seed. When stalks appeared 11.7 per cent of them were destroyed, and lightness of grain at harvest time reduced the yield by from 13 to 20 per cent. The total loss arising from meteorological conditions is estimated at 59.7 per cent of the crop. The data obtained are more fully stated in tables and charts.

Wild oats and false wild oats: Their nature and distinctive characters, N. CHAPLIN (*Canada Dept. Agr., Seed Branch. Bul. S-7, 1912, pp. 11, pls. 4*).—Examples of the Banner, Newmarket of Abundance, Old Island Black, and Storm King types of false wild oats (also called sports, white wild oats, and albino wild oats) have been grown for from 2 to 7 years without change in appearance. A black oat of unknown name also grew true to type for 2 years. The author does not regard false wild oats as dangerous or think it likely that they result from crosses of wild and cultivated species.

Annual report of the Dumraon Agricultural Experiment Station, 1910-11, A. C. DOMBS (*Ann. Rpt. Dumraon Expt. Sta. [Bengal], 1910-11, pp. 5*).—This is a report of fertilizer, variety, and drainage tests of rice.

The "Rab" system of rice cultivation in western India, H. H. MANN, N. V. JOSHI, and N. V. KANITKAR (*Mem. Dept. Agr. India, Chem. Ser., 2 (1912), No. 3, pp. 141-193*).—A brief account of earlier experiments on the value of the "Rab" system (*H. S. R.*, 23, p. 129) is followed by a full discussion and numerous tables presenting the data obtained in the authors' experiments, from which the following conclusions are drawn:

The benefits from this system vary widely but "normally the weight of the seedlings obtained is from one and a half times to twice as great as without the treatment." Nearly 60 per cent of this increase results from heating, the remainder being due to the ash and other materials added. During ordinary burning with cow dung the temperature does not rise above 110° C. at a depth of 1 in. and 85° at a depth of 1 in., and the heating process lasts from 1½ to 2 hours or less.

Only very slight results were obtained by heating the soil to 75°. At higher temperatures the fertility was greatly increased, reaching a maximum at about 125°. The maximum effect resulted from heating immediately before the sowing of the crop. A little less effect resulted from heating 6 weeks before sowing, while comparatively little effect resulted from heating 3 months before sowing.

The supply of assimilable mineral plant food and of soluble organic matter in the soil was considerably increased by heating, but little effect was produced when growing rice plants were treated with extracts of such heated soils. The speed of germination was not beneficially affected but was apparently slightly retarded at times. This did not appear to be due to the production of a deleterious substance.

Heating materially changed the physical condition of the soil by bringing a large part of the viscous, sticky clay substance into such condition that it

would not remain in suspension in water. This effect was temporary, disappearing after 3 months, and the mere keeping of air-dry soil for 6 weeks materially reduced it. This power to precipitate soil is shared by oil cake (safflower cake) but not by any other cakes tested. This change in the physical condition of the soil is only a secondary cause of the beneficial effect of the "Ráb" process.

The heating destroyed a large proportion of the active aerobic life of the soil, but even when the soil was kept in an air-dry condition this aerobic activity became far greater in 6 weeks than in the unheated sample, though this difference disappeared on further keeping of the soil. Soil fertility is not considered dependent on the presence of aerobic soil organisms during plant growth, but on the contrary "the fertility of a heated soil is greatest when the aerobic organisms present are fewest."

The author suggests as a more economical method of obtaining the benefits of this method that soil be burnt in heaps, as this would require less fuel and work.

The mutual relations of weight and sugar content in *Beta vulgaris saccharifera*, K. ANDRĚLÍK, V. BARTOŠ, and J. URBAN (*Ztschr. Zuckerindus. Böhmen*, 36 (1912), No. 4, pp. 193-210, figs. 4; *abs. in Bot. Cenibl.*, 119 (1912), No. 21, p. 541).—Determinations on a large number of sugar beets are said to have shown that the weight of these roots is more readily modified than is the sugar content. The experiments did not tend to support the statement that the greater the weight the less the sugar content, except in extreme and hence rare cases.

The variability and relationship of weight and sugar content of sugar beets, K. ANDRĚLÍK, V. BARTOŠ, and J. URBAN (*Ztschr. Zuckerindus. Böhmen*, 36 (1912), No. 4, pp. 193-210, figs. 4).—Tables and charts present data obtained in statistical studies of the weight and sugar contents of various strains of sugar beets.

From data presented, the authors conclude that the weight of the beet root shows fluctuating variability in accordance with the Quetelet-Galton law. Each strain shows its own correlation between root weight and sugar percentage. In only a few unusual cases does it occur that low sugar content accompanies a very unusual root weight, and these cases probably result from abnormalities in the use of plant food.

Contribution on the relation between the sugar content and weight of sugar beets, K. NOVOTNÝ (*Ztschr. Zuckerindus. Böhmen*, 36 (1912), No. 5, pp. 269-272).—This article presents the results of a further investigation and verifies the conclusions of the paper noted above.

Recent chemical and physiological investigations on the sugar beet (*Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases*, 3 (1912), No. 4, pp. 907-911).—The results of a number of recent investigations are given tending to the following general conclusions:

"It may be considered as settled that a want of light is injurious to the beet crop, giving . . . a product of low industrial value. While it can not be denied that sugar, as succharose, is formed in the organs of assimilation of the beet, it is not equally certain that it circulates as such in its passage to the organs of reserve. There is no doubt that beets in the second year of growth can produce and store sugar. In general, the correlation between the decrease in sugar content and the increase of weight of root does not hold good. With a perfect selection (élites) the injurious influence of root weight on sugar content can be eliminated."

Bibliography is appended.

Influence of light on the development of the sugar beet, A. SPIET (*Osterr. Ztschr. Zuckerindus. u. Landw.*, 40 (1911), No. 6, pp. 848-856).—The

author summarizes some work of others upon this subject. In his own experiments he found that the weight per plant of the leaves of the shaded samples selected ranged from 188 to 198 gm., as compared with from 221 to 504 gm. in case of the unshaded samples. The weights per root ranged from 51.6 to 81.6 gm. and from 202.3 to 743 gm. in case of the shaded and unshaded beets, respectively. The leaf weight was from almost $2\frac{1}{2}$ to about $3\frac{1}{2}$ times as great as the root weight of the shaded samples and from about $\frac{1}{2}$ to $1\frac{1}{2}$ times as great as the root weight in case of the unshaded samples. The sugar content of the shade-grown roots averaged 13.9 per cent, while that of the unshaded roots ranged from 10.8 to 12.9 per cent. The sugar production per shade-grown root averaged 92 gm. but ranged from 25.5 to 85.4 gm. in case of the unshaded roots.

The author presents computations from the work of Briem which indicate that the shade-grown roots had a greater average leaf weight and a much smaller average root weight than did the unshaded beets. The work of Strohmayer verified this result, and indicated a somewhat lower average sugar content in case of the shade-grown beets and a much lower sugar production per beet.

Other work on this subject has already been noted (E. S. R., 25, p. 236).

[Manganese as a sugar beet fertilizer], E. ZACHAREWICZ (*Rev. VII*, 37 (1912), No. 955, pp. 471-473).—Three sugar beet varieties gave higher yields on plots that had received manganese at the rate of 150 kg. per hectare (133.5 lbs. per acre) than they did on the check plots. Two other varieties gave higher yields on the check plots. Analyses showed similarly variable results as to density, purity quotient, and the sugar and dry matter percentages.

Report on sugar experiments, 1910-11 (*Bul. Dept. Agr. Jamaica, n. ser.*, 2 (1912), No. 5, pp. 1-27).—This is a report of variety and fertilizer tests with sugar cane conducted on a number of estates in Jamaica. Tables state the results of mechanical and chemical analyses of soils of different estates and the cane yields obtained after various fertilizer applications.

Timothy production on irrigated land in the Northwestern States, M. W. EVANS (*U. S. Dept. Agr., Farmers' Bul.* 502, pp. 32).—This publication discusses the growing of timothy in mixture with alfalfa in place of clover, a practice at present used in only a few of the more important timothy-producing centers, though well adapted to conditions on most of the irrigated land where timothy is produced, and describes the methods of seeding, irrigating, cultivating, fertilizing, harvesting, and marketing the crop, together with the treatment and management of established timothy meadows and the crop rotations followed in the region.

[Canada weeds and weed seed] (*Canada Dept. Agr., Seed Branch. Bul.* 8-6, 1911, pp. 70, 70s. 177).—The author divides this bulletin into 3 parts: (1) The Seed Control Act, 1911, and Regulations Made by the Governor in Council (pp. 3-10); (2) Seed Samples for Purity and Germination Tests (pp. 11-21); and (3) Weeds and Weed Seeds (pp. 22-67). The third part gives descriptions and illustrations of numerous weeds and weed seeds and brief notes on them.

The eradication of wild onion, J. A. VOELCKER (*Jour. Roy. Agr. Soc. England*, 72 (1911), pp. 404-409).—Land on which wild onions had grown did not produce a single onion strong enough to set seed during 2 years after it had been treated to a mixture of 14 lbs. orchard grass, 7 lbs. tall fescue, 7 lbs. tall oat grass, 1 lb. rough-stalked meadow grass, 3 lbs. chicory, 8 lbs. burnet, 1 lb. yarrow, 3 lbs. kidney vetch, 1 lb. alsike clover, 2 lbs. late-flowering red clover, and 2 lbs. of white clover, or 49 lbs. per acre in all.

Among other methods of eradication tested in pot and plat experiments were applications of lime, gas lime, carbolic acid, sulphocyanid of ammonium, sulphuric acid, arsenic, sulphate of copper, common salt, sulphate of magnesia,

chlorid of magnesium, carbolized lime, and various other materials. Cutting off the flowering heads, pulling up the plants by hand, deep plowing, and burning the soil were also tried without success.

The only field methods which seemed to promise any real success consisted in "lightening the soil by road drift" and "raising the top 8 in. of soil and putting 3 in. depth of ashes below it." "While the use of road drift certainly did good, it was not nearly as good as the employment of ashes." The author regards these results as indicating that the solution of the problem must lie "in the direction of finding some means by which the soil could be rendered lighter and less retentive of water."

HORTICULTURE.

Library of agriculture.—Horticulture and truck farming, H. M. SKINNER and A. L. MCCREDIE (*Chicago*, 1912, vol. 4, pp. 539, pls. 17, figs. 145).—This, the fourth of a series of volumes dealing with agricultural subjects, consists largely of papers which have previously appeared as bulletins of the U. S. Department of Agriculture and of some of the State stations.

Plant protection calendar for field, vineyard, orchard, and garden (*Pflanzenschutzkalender für Feld-, Wein-, Obst- und Gartenbau*. Vienna: K. K. Landw. Bakt. u. Pflanzenschutzstat., 1911, pp. 11).—This calendar outlines the necessary operations throughout the year for combating insect pests, fungus diseases, and other enemies for greenhouse, garden, and field crops.

Influence of fertilizers on the conservation of fruits, N. ESPAILLARD (*Jour. Soc. Nat. Hort. France*, 4^e ser., 13 (1912), July, pp. 470, 471).—The author here summarizes the results secured in a 3-year study of the effect of various fertilizer elements on the keeping quality of pears.

The phosphatic and potassic fertilizers were found to produce large handsome fruits without impairing their keeping quality. The use of nitrate of soda alone, however, resulted in shriveled fruit of poor keeping quality. Nitrate of soda appears to stimulate vegetative growth and to hasten maturity at the expense of quality of the fruit.

Profitable fruit storage cellar, W. J. LEWIS (*New England's Homestead*, 65 (1912), No. 8, pp. 140, 142, fig. 1).—A fruit storage cellar capable of holding about 6,000 bu. of apples is here described and illustrated.

Orcharding in Maine, A. K. GARDNER and H. P. SWEETSER (*Bul. [Maine] Dept. Agr.*, 11 (1912), No. 3, pp. 52, figs. 11).—A popular treatise on apple orcharding.

How to make an orchard in British Columbia, J. T. BEALBY (*London*, 1912, pp. 86).—A popular handbook dealing especially with orchard practices in British Columbia.

The Georgia apple, E. M. HAFFER (*Proc. Ga. State Hort. Soc.*, 36 (1912), pp. 46-52).—A general discussion of apple culture in the Georgia mountains, including a descriptive list of native Georgia apples.

Pruning olives in Italy, N. PINTO (*Bol. Arbor. Ital.*, 7 (1911), Nos. 2, pp. 55-65; 3-4, pp. 149-178, figs. 2).—A descriptive account of the methods employed in pruning olives in the Province of Bari, Italy.

Contribution to the study of the reconstitution of vineyards.—I, The grape scissors, as a sketch of the ampelography of Vaud, J. BURKAT and I. ANKER (*Contribution à l'Étude de la Reconstitution des Vignobles. I, Les Cépées-Greffons ou Essai d'Ampélographie Vaudoise*. Geneva and Paris, 1910, pp. XVIII+126, pls. 16).—This is the first of a series of 3 volumes to deal with the reconstitution of vineyards in the Vaud region. The present volume contains a study of the varieties of grapes grown in this region that have furnished the

plans in the reconstitution of vineyards with American stocks. The succeeding number will deal with the results secured with various stocks, scions, and direct bearing.

American stocks for Cape vineyards, A. J. PEROLD and I. TRIBOLET (*Agr. Jour. Union So. Africa*, 4 (1912), Nos. 1, pp. 99-109; 2, pp. 222-257).—This comprises a report of an inquiry into the suitability of the American stocks on which the vineyards in the Cape Province have thus far been reconstructed.

Fruits of warm countries.—I, A general study of the fruits, P. HUBERT (*Fruits des Pays Chauds. I, Étude Générale des Fruits*, Paris, 1912, pp. X+728, figs. 227).—This is the first volume of a 2-volume work dealing with the principal fruits of tropical and subtropical regions. Especial attention is given to the more widely distributed table fruits, including those susceptible to large local consumption and those suitable for developing an export trade. A discussion under each kind of fruit deals more or less in detail with its history, distribution, synonymy, botany, varieties, culture, enemies, uses, and commerce. A succeeding volume is to treat in detail of the fruit industries in warm climates.

Manurial experiments on cacao in Trinidad, J. DE VERTEUIL (*West Indian Bul.*, 12 (1912), No. 3, pp. 320-344).—A description, including the results to date, is given of manurial experiments on cacao and Castilla rubber being conducted on various estates in Trinidad, both by the Trinidad Department of Agriculture and the Trinidad Board of Agriculture. No conclusions are drawn.

The date palm (*Phoenix dactylifera*) in Egypt, A. PAOLETTI (*Agr. Colon. Italy*), 6 (1912), No. 6, pp. 248-258).—An account of date culture in Egypt, including also brief notes on the varieties grown.

The planting and care of shade trees (Trenton, N. J.: Forest Park Reserve Com., 1912, pp. 128, pls. 5, figs. 43).—This comprises the 3 following papers, the first two of which were originally published in the report of the Forest Park Reservation Commission of New Jersey for 1908 and are here thoroughly revised: The Planting and Care of Shade Trees, by A. Gaskill and J. O. Hazard (pp. 7-65); Insects Injurious to Shade Trees, by J. B. Smith (pp. 67-91), previously noted (*B. S. R.*, 25, p. 254); and Diseases of Shade and Forest Trees, by M. T. Cook (pp. 93-124).

The pecan, C. A. REED (*U. S. Dept. Agr., Bur. Plant Indus. Bul.*, 251, pp. 58, figs. 25).—A practical treatise on the pecan and its culture, discussed under the following general headings: Botanical classification of the pecan, natural distribution, habit of growth, flowering habit, decrease in number of native trees, cultural distribution, extent of planting, economic importance, culture, propagation, stocks for grafting and budding, planting, nut handling, and varieties.

Making a garden of perennials, W. C. EGAN (*New York*, 1912, pp. 52, pls. 8).—A short cultural treatise including lists of dependable perennials for different soils and situations.

Molding concrete flower pots, boxes, jardinières, etc., A. A. HOUGHTON (*New York*, 1912, pp. 52, figs. 8).—A practical treatise explanatory of the construction of the molds for and the construction of various designs of concrete flower pots, jardinières, and window boxes of concrete, together with the reinforcement and surface treatment of the casts after molding.

Molding concrete fountains and lawn ornaments, A. A. HOUGHTON (*New York*, 1912, pp. 56, figs. 14).—A practical treatise illustrating and explaining in detail the molds for and the methods of molding various styles of concrete fountains, lawn seats, curbing, hitching posts, pergolas, sundials, lawn vases, and other ornamental garden furniture of concrete.

FORESTRY.

Forestry in New England, R. C. HAWLEY and A. F. HAWES (*New York and London, 1912, pp. XV+479, pls. 2, figs. 140*).—Part 1 of this work furnishes the woodland owner a brief survey of the whole field of industry and provides him with a working knowledge of forestry. The successive chapters discuss silvics, silvicultural systems, silvicultural characteristics of the important New England trees, forest planting and seeding, improvement cuttings, injuries from animals, forest insects and fungi, forest fires, timber estimating and valuation, and growth of trees and forests.

Part 2 deals with New England forests and their management, the subject matter being discussed under the following chapter headings: The original forests and their early development, present forest conditions, the spruce region, the northern hardwoods region, the white-pine region, the sprout hardwoods region, the progress of forestry in New England, and the yield to be expected from New England forests under proper management.

Report on timber conditions around Lesser Slave Lake, D. R. CAMERON (*Dept. Int. Canada, Forestry Branch Bul. 29, 1912, pp. 54, pl. 1, figs. 17*).—This comprises a detailed report of a reconnaissance survey made during the summer of 1911. The general conditions of the region are described and the country examined is discussed by districts. Proposed forest reserves are suggested and a scheme of fire protection, illustrated by a map, is also submitted. A number of tables summarizing the important information about the country are appended.

The forest trees of Britain, C. A. JOHNS, revised by G. S. BODLAKE (*London and Brighton, England, 1912, 10. ed., pp. XIV+431, pls. 32, figs. 152*).—A revised edition of the late author's work, which is essentially a handbook of popular information relative to the lore, distinguishing characteristics, adaptation, and planting value of the principal trees and shrubs grown in England. See also a previous note (*E. S. R.*, 26, p. 642).

Notes on Kerry woods, illustrating methods of collecting and utilizing information for a forest survey, R. L. ROBINSON (*Jour. B. Agr. [London], 1912, Sup. 3, pp. 64, pls. 7, figs. 4*).—The investigations described were primarily undertaken with the object of obtaining some accurate figures relating to the growth of timber in one of the more hilly districts of Wales. The scope of the work was broadened in order to settle the lines on which a forest survey on a large scale should proceed.

The introductory chapter deals with the topography, climate, geology, and soil of the Kerry woods. The succeeding chapters discuss the methods of measurement and details of growth of different species, together with the utilization of the data for the survey.

Complete yield tables for British woodlands and the finance of British forestry, P. T. MAW (*London, 1912, pp. XII+108, figs. 36*).—This comprises the results of the author's investigations concerning the growth of timber in Great Britain and the financial returns to be obtained therefrom. The tables as given for both deciduous and coniferous trees on different qualities of soil show for various aged stands the amount and value of thinnings removed, crop left after thinning, increment, land rentals per annum from date of planting, and the annual income from a normally stocked forest.

Taxation investigations.—III, Determination of the form of standing trees, T. JONSSON (*Skogsvårdsför. Tidskr., 1912, Fackafd., No. 4, pp. 235-275, figs. 11*).—The author's method of determining the total cubical content of standing trees, yield, and increment for the purpose of taxation is described.

A method of investigating yields per acre in many aged stands, H. H. CHAPMAN (*Forestry Quart.*, 10 (1912), No. 3, pp. 453-469, figs. 3).—The author discusses the principles involved in determining the area occupied by each age class in a managed forest and gives the details of a plan applied to uneven aged stands of shortleaf pine in Arkansas.

On the arrangement of silvicultural experiments and the classes of forest yield tables, VATEB (*Tharand. Forstl. Jahrb.*, 63 (1912), No. 3, pp. 252-264).—A discussion of methods of conducting silvicultural experiments.

Seventh annual report of the Forest Park Reservation Commission of New Jersey for the year ending October 31, 1911 (*Ann. Rpt. Forest Park Reserv. Com. N. J.*, 7 (1911), pp. 92, pls. 14).—This contains a summarized report of the work of the Forest Commission (pp. 9-18), together with the following detailed reports: The Forest Fire Service, by C. P. Wilber (pp. 19-67), and Report of the State Forester, by A. Gaskill (pp. 68-90).

Progress report of forest administration in the Province of Eastern Bengal and Assam for the year 1910-11, A. V. MONRO and H. CARTER (*Rpt. Forest Admin. East. Bengal and Assam, 1910-11*, pp. 92, pl. 1).—This is the customary report relative to the constitution, management, and administration of the state forests of Eastern Bengal and Assam, including the financial results for the year. All of the important data are appended in tabular form.

Report on state nurseries and plantations for the year 1909-10, W. C. KANINGTON (*New Zeal. Dept. Lands, Rpt. State Nurseries and Plantations, 1909-10*, pp. 33, pls. 6).—This comprises the combined reports of the superintending nurserymen of the New Zealand forest nurseries and plantations under their supervision for the financial year ended March 31, 1910.

Emory oak in southern Arizona, F. J. PHILLIPS (*U. S. Dept. Agr., Forest Serv. Circ.* 201, pp. 15, pls. 5).—An account is given of the Emory oak (*Quercus emoryi*) relative to its range and occurrence, climate, soil and moisture requirements, associated species, characteristics of the tree, causes of injury, utilization, and management.

Report on the investigation of bamboo as material for production of paper pulp, W. RAUER (*Indian Forest Rec.*, 3 (1912), No. 3, pp. 37, pls. 2).—This comprises a report of investigations conducted under the direction of the Forest Research Institute to determine the suitability of 5 different species of bamboo for the manufacture of cellulose at a marketable cost.

The author found that where the cost of delivery to mill sites is not excessive, all 5 species are suitable for the manufacture of cellulose, and that all the species, except one, may be mixed in treatment. The culms of all ages may be mixed indiscriminately in treatment, and nodes need not be rejected, providing the following treatment is adopted: Culms not to be cut until the shoots of the year are full-grown; a period of seasoning of not less than 3 months to elapse before they are used; crushing; extraction of starchy matter; and digestion with sulphate liquor. Neither the sulphite nor the soda process was found to be economical in the production of cellulose from bamboo.

Rubber: Its culture and preparation, K. W. WOLF-CZAPEK (*Der Kautschuk: Seine Gewinnung und Verarbeitung. Berlin, 1912*, pp. 132, figs. 51).—This comprises a concise handbook of information relative to the collection, preparation, commerce, and chemistry of rubber, as well as the vulcanization and manufacture of soft and hard rubber articles.

A short bibliography is appended.

[Rubber in the Federated Malay States], L. LEWTON-BRAIN (*Fed. Malay States, Rpt. Dir. Agr.*, 1911, pp. 1-10).—A report on rubber culture in the Federated Malay States for the year 1911, which discusses acreages, cultiva-

tion, manufacture, insect pests, and diseases. The total acreage planted with rubber at the end of 1911 was 352,974 as compared with 245,774 acres in 1910.

The excretion of serum from moist rubber after pressing; A. ZIMMERMANN (*Pflanzer*, 8 (1912), No. 7, pp. 389-398).—In experiments conducted to determine a method of preventing further excretion of moisture from rubber after being pressed, a method devised by D. Sandmann, which consists in immersing the pressed rubber in boiling water for a short time, was found to reduce materially the subsequent excretion of serum. The author suggests the need of further experiments to determine the effect of the boiling water on the physical properties of rubber.

Commercial creosotes with special reference to protection of wood from decay, C. P. WINSLOW (*U. S. Dept. Agr., Forest Serv. Circ.* 206, pp. 33, figs. 17).—In continuation of previous investigations relative to the properties, methods of analysis, etc., of various creosotes (*E. S. R.*, 19, p. 812), the results to date are here presented of an investigation of the quality and prices of commercial creosotes.

An account is given of the more important sources of wood-preserving creosotes, methods used in their production, their general properties and the quality, price, and quantity of the creosotes annually consumed in this country. A series of fractional distillation and index of refraction curves are given for samples classed as coal-tar creosotes and mixed coal-tar creosotes. Samples of a large number of authentic coal tars, oil tars, and wood tars have been collected from which creosotes are being distilled and critically analyzed and examined. A number of these samples are here classified and described in tabular form, the data given showing the character of the oil, the fractions and the residue, together with the sulphonation residues of fractions.

The method used in analyzing the creosotes discussed is appended.

Bibliography on forestry published during 1911 (*Skogsvärdsför. Tidskr.* 1912, *Packad.*, No. 3, pp. 217-232).—The bibliography includes literature on forestry topics published in the German, French, English, and Scandinavian languages.

DISEASES OF PLANTS.

The relation of certain parasitic fungi to the age and development of the host plant, M. T. COOK and J. J. TAUBENHAUS (*Abs. in Phytopathology*, 1 (1912), No. 2, p. 98).—According to the authors, experiments have proved that laboratory inoculations made on picked fruits or detached portions of plants are not sufficiently reliable for definite conclusions. It has been found that there is a difference in resistance between picked fruits kept in the laboratory and unpicked ones, and between young and older fruits of the same tree, as well as between fruits of different varieties. This resistance is held to be intimately associated with the cell contents of the host. It is believed that *Glomerella rufomaculans* of the apple is able to attack many different hosts and that this explains the presence of so many so-called new species.

Studies on the biology and morphology of *Kuehneella albidia* and *Uredia mülleri*, S. SPILLIN (*Mycol. Centbl.*, 1 (1912), No. 5, pp. 131-137).—From his investigations the author concludes that these are two developmental forms of one and the same fungus.

Notes on some heteroecious rusts of Connecticut, G. P. CLINTON (*Abs. in Phytopathology*, 2 (1912), No. 2, p. 94).—The author reports the teliospore stage of *Gymnosporangium japonicum* for the first time in America, it having been collected on two different importations of *Juniperus chinensis* from Japan. *Uromyces peckii* is shown by artificial inoculations to be the aecidial stage of *Pucciniastrum myrtilli*. *Pinus austriaca*, *P. maritima*, and *P. ponderosa* are

reported as new American hosts for *Peridermium pyriforme*. Notes are also given on species or stages of fungi not previously reported from Connecticut.

The development of *Gloeosporium malicorticis*, H. S. JACKSON (*Abstr. in Phytopathology*, 2 (1912), No. 2, p. 95).—A description is given of the perfect or ascospore stage of *G. malicorticis*, which the author has been having under observation for a number of years.

Pure cultures of the ascospores were made, and inoculation experiments showed that it takes one year for the cankers to mature. All inoculations produced typical cankers, which bore conidia typical of *G. malicorticis*.

Attention is called to the resemblance both in conidial and ascospore stages of the fungus *Pseudopeziza ribis*. The exact generic position of the fungus is somewhat doubtful, but it is described as *Neofabrea malicorticis*, a new combination.

The structure and development of crown gall: A plant cancer, E. F. SMITH, HAZEL A. BROWN, and LUCIA MCCULLOCH (*U. S. Dept. Agr., Bur. Plant Indus. Bul.* 265, pp. 60, pls. 109, figs. 2).—This bulletin is in continuation of one previously issued (*E. S. R.*, 25, p. 243), and gives detailed descriptions of a large number of plates made in studying this disease, the histological evidence being read upon them.

[Crown gall on mangolds in England], R. H. BIFFEN (*Jour. Roy. Agr. Soc. England*, 72 (1911), p. 378, fig. 1).—A tumor-like outgrowth on the roots of mangolds observed in 1910, and more closely studied in 1911, is found to be a case of crown gall ascribed to *Bacterium tumefaciens*. This disease has been certainly identified only in Norfolk and Shropshire, but is suspected to exist on raspberry roots in Cambridgeshire. Further investigations are contemplated.

On two injurious fungi of garden plants, G. KÖCK (*Separate from Bl. Obst. Kon. Gartenbau u. Kleintierzucht*, 1911, No. 11, pp. 3).—The author discusses briefly a fungus sent him for examination from Silesia on a species of *Erica*, supposed by him to be *Oldium ericinum*, also a myxomycete, said to be *Plasmodium alba*, found on young asters and spreading in manure beds. The results of his measurements and observations are also given.

Treatment of seed wheat for smut (*Agr. Gaz. N. S. Wales*, 23 (1912), No. 5, p. 306).—Trials were made with 0.5 per cent, 1 per cent, 1.5 per cent, and 2 per cent solutions of bluestone, and also of the effect of dipping the wheat in lime-water afterwards.

These tests showed that any solution of bluestone stronger than 1.5 per cent likely to affect seriously the germination of the grain, and even at this strength it is advisable to dip the wheat in a mixture of 1 lb. lime to 20 gal. water.

Trials of alleged preventives for smut in wheat (*Agr. Gaz. N. S. Wales*, 23 (1912), No. 5, p. 394).—This is a summary of reports from experiments at the Wm. Wagge, and Bathurst experiment farms with two commercial preparations, claimed to prevent smut in wheat, as compared with bluestone (2 per cent) and lime-water.

One of these was found to be equal to bluestone as a protective, but both lacked the germinating power to a greater extent, so that neither is recommended as a substitute for bluestone.

The diseases of ginseng and their control, H. H. WHEITZEL and J. ROSENBERG (*U. S. Dept. Agr., Bur. Plant Indus. Bul.* 250, pp. 44, pls. 12, figs. 5).—This is a second attempt to bring together the information relating to the diseases of the drug plant known as ginseng, the first publication having been previously noted (*E. S. R.*, 18, p. 271). The data presented on each disease are arranged under the heads of history, symptoms, cause, and control. Among the

diseases described are *Alternaria* blight, *Phytophthora* mildew, *Vermicularia* stem anthracnose, *Pestalozzia* leaf anthracnose, papery leaf spot, injury caused by cold following the use of Bordeaux mixture, the damping off of seedlings due to *Rhizoctonia*, *Pythium*, etc., wilts due to *Acrostalagmus* and *Fusarium*, nematode root galls, and root rots due to a number of causes. The spraying of ginseng, soil sterilization, relation of fertilizers to diseases, and the drainage of ginseng beds are also discussed.

An external dry rot of potato tubers, Miss C. O. JAMIESON and W. H. WOLLENWEBER (*Jour. Wash. Acad. Sci.*, 2 (1912), No. 6, pp. 146-152, fig. 1; *Abstr. Mycol. Centbl.*, 1 (1912), No. 6, p. 180).—A *Fusarium* was found on potatoes affected with dry rot which was proved by inoculation experiments to be a wound parasite capable of causing this disease. The fungus is claimed to be a new species, distinguished by its two forms of conidia, and is described by the authors under the name *F. trichothecioides* n. sp. It claimed that the disease is clearly differentiated from the wilt and dry rot ascribed to *F. oxysporum*.

The relationship of *Oospora* scabies to the higher bacteria, G. C. HAM (*Abstr. in Phytopathology*, 2 (1912), No. 2, p. 97).—A study of cultures of the organism causing the potato scab has led to the conclusion that the organism should be placed in the genus *Streptothrix*, one of the higher bacteria.

Biochemical research on leaf-roll of potato.—III, Chemical characters, G. DOBY (*Kisérlet. Közlem.*, 15 (1912), No. 2, pp. 210-222; *Ztschr. Pflanzenkrankh.*, 22 (1912), No. 4, pp. 204-211).—Further analyses (E. S. R., 26, p. 547) lead the author to conclude (1) that the chemical composition of tubers affected with this disease shows different variations from those observed in the case of sound ones, but that the limits of such variations are as yet difficult to determine on account of complications arising from such influences as soil, weather, variety of potatoes, etc.; (2) that the diseased tubers show a lower average in dry substance, ash, protein, and carbohydrates as a whole; (3) that the sound and diseased tubers differ most in the total and the composition of their dry substance and in starch; and (4) that the biochemical processes are more retarded in diseased than in sound plants, but that it is probably not yet practicable to distinguish diseased potatoes on the basis of chemical analyses alone. The results are given in tabulated form.

Treatment of seed potatoes with formalin (*Agr. Gaz. N. S. Wales*, 23 (1912), No. 5, p. 408).—In an experiment at the Bathurst Experiment Farm, seed potatoes treated with formalin to prevent the development of scab and other diseases were practically a failure, while plots of untreated seed germinated well.

Gummosis, L. P. DE BUSSY (*Médec. Deli-Proefstat. Medan*, 6 (1911), No. 2, pp. 77-89).—An account of studies carried on during 1910-11 on gummosis of tobacco.

This disease is claimed to be caused in case of the plants studied by *Bacillus solanacearum*, which is alleged to attack also other plants. Artificial inoculations, it is stated, developed infection in case of potato, indigo, sesame, tomato and other economic plants. The details are given of investigations carried on on the influence of cultivation and manuring on the progress of the disease.

The Deli form of *Bacillus solanacearum*, J. A. HONING (*Médec. Deli-Proefstat. Medan*, 6 (1912), No. 7, pp. 240-250).—This is a detailed account of the author's studies on the morphological and physiological characters of *B. solanacearum*, claimed to cause gummosis of tobacco and other plants at Medan, and a detailed comparison of these characters with those of *B. nicotianae*, said to cause a like disease of tobacco in Japan. The conclusion is reached that the two properly belong to the same species, the former being probably a somewhat weakened form of the species.

A serious root disease of radish, J. T. BARRETT (*Abs. in Phytopathology*, 2 (1912), No. 2, p. 96).—A disease of radishes, characterized by a peculiar browning or blackening of a portion or all of the root, is described. The infected tissue in the early stages of the disease remains sound and brittle, but as the disease progresses the cells are broken down and rots due to saprophytic forms frequently set in. The organism which causes the disease is said to be *Aphanomyces levii*, long known as a saprophyte inhabiting the soil and water. No successful means of control have yet been determined.

Tomato leaf rust (*Jour. Bd. Agr. [London]*, 18 (1912), No. 11, pp. 320, 321, p. 1; *abs. in Mycol. Centbl.*, 1 (1912), No. 6, p. 181).—Leaves, stems, and occasionally fruits are attacked by this disease, ascribed to *Cladosporium fulvum*. Fungicides avail only when applied to germinating spores. The entire surface of the tomato plant should, therefore, be covered frequently with half-strength Bordeaux mixture if the plants are young, but with potassium sulphid solution (1 lb. in 4 gal. of water) if flowers and young fruit are present.

Treatment of chlorosis in fruit trees and vines, L. HILTNER (*Prakt. Bl. Pflanzenbau u. Schutz*, n. ser., 10 (1912), No. 5, pp. 49-51).—In continuation of previous studies (E. S. R., 25, p. 518), experiments were made in supplying iron and other salts to chlorotic trees and vines. The salts were made up into a mash or porridge with water and introduced into holes bored in the trunks, the holes being afterwards closed with corks and tree wax. With the exception of a few cases in which the holes are thought to have been in dead tissue, the experiments were considered successful, being followed by the restoration of the green color and by luxuriant growth.

Oily or glassy fruits, I. GROSS (*Prakt. Bl. Pflanzenbau u. Schutz*, n. ser., 10 (1912), No. 5, pp. 56, 57).—Attention is called to an oily or glassy appearance said to be confined almost exclusively to apples. This is noted in spots on the surface or beneath the skin, injuring the appearance and sometimes the flavor of the fruit. It is said that frequently as much as 5 per cent of the fruit is thus affected, and sometimes a much larger proportion, the trouble being especially noteworthy in 1911.

Inoculation experiments with fungi associated with apple leaf spot and anker, C. E. LEWIS (*Phytopathology*, 2 (1912), No. 2, pp. 49-62).—The author began in 1908 a study of the fungi associated with apple diseases in Maine orchards, and in the present paper the results of inoculations with fungi isolated from diseased branches and leaves are given.

A considerable portion of the leaf spot which occurs in Maine orchards is said to be due to the fungus *Sphaeropsis malorum*, although similar spotting has been observed in orchards which is attributed to injury due to spraying with Bordeaux mixture. Thus far, *Sphaeropsis* has been the only fungus isolated from apple leaves in the State which has caused spotting on the leaves when inoculations were made from pure cultures. *Phyllosticta limitata*, *Coniophyrium pirina*, and *Coryneum follicolum* grew and fruited on dead spots when the spores were sprayed on the leaves, but no new spots were produced.

A number of fungi have been found to occur on branches and twigs of the apple. Of these *Sphaeropsis* does the greatest damage, but it has been proved by inoculation experiments that *Coryneum* and *Phoma* can cause considerable injury to the young trees and branches of orchard trees. *Myxosporium* and *Pyrenopeziza*, it is claimed, do not attack healthy branches, but may attack weakened ones.

Some notes on *Sphaeropsis malorum*, C. BROOKS and MARGARET DEMERITT (*Abs. in Phytopathology*, 2 (1912), No. 2, p. 94).—The authors report having isolated two forms of *Sphaeropsis* from decaying apples. One produces spores typical of *S. malorum*, while the other has spores that are longer and more

oblong in outline. The two forms retain their distinctive characteristics when grown on the same culture medium. Both have been obtained from the fruit. The pycnidia from cankers have nearly always contained the long spores. In inoculations on foliage, positive results have been obtained only with the long-spored form. The large number of leaf spots beneath cankers are believed to furnish evidence of the transfer of the fungus from the limb to the leaves.

Apple fruit spot and quince blotch, C. BROOKS and CAROLINE A. BLACK (*Phytopathology*, 2 (1912), No. 2, pp. 63-72, pls. 2).—This paper includes a second report on the fruit spot of apples (*E. S. R.*, 20, p. 847) and a discussion of a similar disease of quinces.

A *Phoma* stage has been found for the fungus causing the fruit spot of apples, and as a consequence the name of the fungus has been changed from *Cylindrosporium pomi* to *Phoma pomi*. A spot similar to that on apples is reported on quinces, and cross inoculations have shown that it is due to the fungus mentioned above. This disease has been previously noted (*E. S. R.*, 4, p. 656).

Three destructive diseases of the peach, E. O. ESSIG (*Mo. Bul. Com. Hort. Cal.*, 1 (1912), No. 8, pp. 337-359, figs. 4).—These diseases are peach yellow, peach rosette, and little peach. In case of each an account is given of the history of the disease, its destructiveness, distribution, the plants attacked, nature and symptoms of the disease, its modes of distribution, and recommendations looking to its control. To this is added the author's correspondence with various sources of information, also the California state quarantine law relating to peach yellows and rosette.

The method of spreading of the olive knot disease, W. T. HORNE, W. R. PARKER, and L. L. DAINES (*Abs. in Phytopathology*, 2 (1912), No. 2, p. 96).—This is a progress report on studies carried out near Sacramento, Cal., to discover a method for controlling the olive knot disease due to *Bacterium savastanoi*.

No biting or piercing insect or other transporting agent was discovered, but it was found that vigorous knots exude bacterial slime when wet. It was demonstrated, both by platings from the slime and from direct inoculations, that this slime contains the organism in abundance, and its dissemination is accounted for by the spattering of rain, and the accidental transfer by birds, insects, or other agencies. Entrance into the living bark is believed usually to take place on healed wounds.

Comparative experiments with certain sprays for controlling *Peronospora viticola* on the grape, A. BRETSCHNEIDER (*Ztschr. Landw. Versuchs. Österr.*, 15 (1912), No. 2, pp. 147-152).—This series of experiments repeats with certain extensions previous ones already noted elsewhere (*E. S. R.*, 25, p. 751), results being given in detail with discussions of comparative cost in employment of the various preparations tested.

The downy mildew fungi and their control, A. BRETSCHNEIDER (*Mongol. Landw.*, 5 (1912), No. 5, pp. 138-147, figs. 6).—Continuing the above the author gives a brief discussion of certain *Peronosporaceae* as enemies of various fruits, trees, wild plants, etc., with recommendations as to preventive and remedial measures.

A knot of citrus trees caused by *Sphaeropsis tumefaciens*, FLORENCE HEDGES and L. S. TENNY (*U. S. Dept. Agr., Bur. Plant Indus. Bul.* 247, pp. 74, pls. 10, figs. 8).—This bulletin gives an account of an infectious disease of citrus trees which has caused extensive losses in Jamaica. The same or a similar trouble has been recently discovered in the United States. The investigation reported have extended through a period of 6 years, during which time the

cause of the disease has been established by means of repeated inoculations, excisions, and reinoculations.

The fungus causing the disease, *S. tumefaciens*, has been isolated from knots on lime and orange trees, and small knots have been also obtained from pomelo, lemon, tangerine, and *Citrus trifoliata*. The fungus penetrates the tissues far beyond the original point of infection, and a badly infected tree is a mass of tumors, sometimes not more than half an inch separating them. On the other hand, there may be considerable distance between two secondary tumors with no external evidence of the fungus, but microscopical examination reveals its presence in small quantities throughout the intervening portion of the stem. Occasionally an abnormal number of new shoots grow from the knots, forming witches' brooms, and this is said to be a characteristic of the disease under favorable conditions. Ultimately that portion of the branch above the knot dies.

Notes are given on the life history of the fungus, which was found to live for several years in the host.

It is suggested that affected limbs be removed, cutting them well below the lowest knots, and that badly diseased trees be uprooted and burned.

Citrus scab, H. S. Fawcett (*Florida Sta. Bul.* 109, pp. 47-60, figs. 8).—A description is given of the citrus scab, due to *Cladosporium citri*. This fungus has been isolated from sour orange leaves and cultivated, and infection experiments have been made demonstrating that it is the cause of the trouble described.

The fungus seems particularly injurious to sour orange and lemon sprouts, and the author recommends the destruction of these, together with spraying with ammoniacal copper carbonate or Bordeaux mixture. The copper carbonate solution is preferred since it usually does not cause an increase of scale insects as sometimes follows the use of Bordeaux mixture. Where the disease is very prevalent the first spraying should be done soon after the petals fall, followed by a second in 2 weeks or a month, and a third at a similar interval if necessary. New growth which comes out at unseasonable times and late bloom, locally known as "June bloom," are said to be most subject to infection, and these should be cut out and destroyed.

A bibliography is appended.

Notes on some diseases of trees in our national forests, II, G. G. HEDGECOCK (*Phytopathology*, 2 (1912), No. 2, pp. 73-89).—In continuation of a previous account (*E. S. R.*, 23, p. 456), the author describes some diseases of deciduous and coniferous trees. The principal fungi attacking deciduous trees enumerated are *Pezizoma dryophilus*, *P. texanus*, *P. sulphureus*, *Fomes igniarius*, *F. everhartii*, *F. africanus*, *F. applanatus*, *F. fasciatus*, *F. fraxinophilus*, and *F. robinia*, while on coniferous trees he notes the occurrence of *Trametes pini*, *P. schweinitzii*, *F. laricis*, *Echinodontium tinctorium*, *P. sulphureus*, *P. amarus*, *Lectinus leptogaeus*, and *Hydnum coralloides*.

The chestnut bark fungus, *Diaporthe parasitica*, C. L. SHEAR (*Phytopathology*, 2 (1912), No. 2, pp. 88, 89).—A brief discussion is given of the generic and specific identification of this organism and its relation to some other fungi.

Some observations on experiments with the chestnut bark disease, J. F. DOLLING (*Abstr. in Phytopathology*, 2 (1912), No. 2, p. 97).—The author points out that the mycelium of this fungus, contrary to common belief, can penetrate and continue to grow in the wood under an old diseased spot after the infected bark has been removed and the surface of the wood treated with tar, paint, etc., and that fruiting pustules may at times be produced in abundance on bare wood; but summer spores are not as liable to be blown about by the wind as has been

previously considered; and that threads of summer spores are dependent mainly, if not wholly, upon moisture conditions for their development.

The chestnut bark disease in Massachusetts, A. H. GRAVES (*Abs. in Phytopathology*, 2 (1912), No. 2, p. 99).—The distribution of this disease in Massachusetts is traced, and the author states that it would probably be practicable for the State to adopt control measures in the northern and eastern parts. Coppice was found to be no more susceptible than seedlings, but burned areas are more apt to be infected than those untouched by fire. The best time for locating the chestnut bark disease is said to be during the month of August.

Summer and fall observations on the growth of the chestnut bark disease in Pennsylvania, CAROLINE RUMBOLD (*Abs. in Phytopathology*, 2 (1912), No. 2, p. 100).—The results of observations on the fungus extending from July to winter are given.

During the summer period the rate of growth of mycelium and production of spores is said to be affected principally by moisture, and this period lasts until the latter part of December. During the transition period the pustules darken in color, often fall off, the mycelium disappears, and the pycnidia become sterile. Specimens collected on the first of December in different parts of the State showed perithecia with ascospores.

Preliminary notes on a twig blight of *Quercus prinus*, DELLA INGRAM (*Abs. in Phytopathology*, 2 (1912), No. 2, pp. 96, 97).—A disease of the chestnut oak which was noted in the spring and summer of 1911 is described. The range of the disease has not been definitely determined, but it has been reported from Connecticut and from various points in Virginia, Maryland, and Pennsylvania.

When viewed at a distance the diseased trees have the appearance of having been attacked by fire blight, the branches and leaves having the brown, blighted appearance characteristic of that disease. The fungus *Dothiorella quercina* has been found associated with the disease and is believed to be the cause of the trouble.

Tannic acid as protection for oak wood against dry rot, C. WEHMER (*Mycol. Centbl.*, 1 (1912), Nos. 5, pp. 138-148, figs. 6; 6, pp. 166-174).—Pursuant to previous studies (E. S. R., 26, pp. 551, 752; 27, p. 355), the author experimented on the growth of *Merulius lacrymans* as affected by tannic and gallic acids in various cultures. Solutions of from 0.5 to 5 per cent strength were found to hinder or stop growth in nearly all solutions. Pine wood, ordinarily attacked and destroyed by this fungus, was protected by a 1 to 2 per cent solution. Practical applications are suggested.

Bacterial black spot of walnut, L. RODWAY (*Agr. Gaz. Tasmania*, 20 (1912), No. 3, pp. 85, 86, fig. 1; *abs. in Jour. Dept. Agr. So. Aust.*, 15 (1912), No. 10, p. 991).—The author notes the appearance of this disease in many of the walnut trees about Hobart. It appears first as small black spots on the surface of both nut and leaf. The disease spreads rapidly, involving finally all parts of both nut and leaf, weakening the tree so that death results in a few years. It appears to start on the surface from new infection each year, the parasitical bacteria gradually penetrating deeper layers of cells as the vitality of the tree becomes reduced by the disease. The trunk, however, does not seem to be attacked directly. It is thought that consistent spraying with Bordeaux mixture will greatly reduce the attack. Removal of infected parts in early stages of the disease is also recommended.

Peridermium cedri as a destructive fungus, R. S. TAYLOR (*Indian Forester*, 38 (1912), No. 5, pp. 222, 223, pl. 1).—This fungus, which produces the characteristic witches' brooms on Deodar trees in certain parts of the Himalayas

but which has hitherto been considered as practically harmless, is here stated to have been found by the author to cause needle-cast, resulting death of branches, cessation of growth in height, forking, and consequent worthlessness of the poles attacked. Removal of all infected parts and trees is suggested as a possible check to the disease.

Parasitism of *Phoradendron juniperinum libocedri*, E. P. MEINECKE (Abs. in *Phytopathology*, 2 (1912), No. 2, p. 92).—The author briefly describes the occurrence of this parasite on *Libocedrus decurrens*. He concludes that as it is capable of living for a great number of years without developing any green exterior parts, the plant has become a true parasite.

The use of fungicides to prevent damping off, C. HARTLEY (Abs. in *Phytopathology*, 2 (1912), No. 2, p. 99).—The author reports the serious damping off of pine seedlings in a nursery in western Nebraska, most of the disease being caused by *Pythium debaryanum*, although *Fusarium* and *Rhizoctonia* caused some damage.

Different methods of soil treatment were tested, and it was found that sulphuric acid gave the best results. This was applied in an aqueous solution at the time of seed sowing, about 0.2 fluid ounce being used per square foot of seed bed. Injury to seedlings is prevented by light watering twice daily until germination is complete.

The detection of inert ingredients of fungicides, E. WALLACE and L. H. EVANS (Abs. in *Phytopathology*, 2 (1912), No. 2, p. 95).—A brief account is given of work carried out for the Insecticide and Fungicide Board of this Department to test various substances in relation to their action on conidia of *Blumerella rufomaculans* and *Sclerotinia fructigena*.

ECONOMIC ZOOLOGY—ENTOMOLOGY.

Proceedings of the Seventh International Zoological Congress (Proc. 7. Internat. Zool. Cong., 1907 [pub. 1912], pp. 972, figs. 102).—Among the papers of interest to the economic zoologist and entomologist are the following: The Reactions of Sarcophagid Fly Larvæ to Light, by W. B. Herms (pp. 152, 153); The Immunity of Caterpillars of *Galleria mellonella* against Tubercle Bacilli and Some Other Microbes, by S. Metalnikoff (p. 282); The Immunity of Caterpillars of *G. mellonella* to Microbes and Their Diseases, by V. Nedrigaloff (p. 238); The Relations Between the Hemipterological Faunas of Europe and North America, by G. Horváth (pp. 560-571); The Recent Progress and Present Condition of Economic Entomology, by L. O. Howard (pp. 572-600); Polymorphism in Hemiptera and Some of Its Significances, by H. Osborn (pp. 601-603); The Influence of Minimum Temperatures in Limiting the Northern Distribution of Insects, E. D. Sanderson (pp. 604, 605), previously noted (E. S. R., 20, p. 851); A Contribution to Our Knowledge of Insecticides, by T. McClintock, E. M. Houghton, and H. C. Hamilton (pp. 613-628), previously noted (E. S. R., 25, p. 362); Eradication of The Southern Cattle Tick, by B. H. Ransom (pp. 648-655), previously noted (E. S. R., 24, p. 260); Notes on *Scutigerella immaculata*, its Eggs and Larvæ, by S. R. Williams (pp. 656-660); Ridding a State of Mosquitoes, by J. B. Smith (pp. 662, 663); A Problem in Antigeny, by C. H. Fernald (pp. 664-667); The Influence of Hibernation and Migration on Animal Parasites, by H. B. Ward (pp. 673-684); Geographical Variation in Birds with Special Reference to Humidity, by C. W. Beebe (pp. 689-701); and Distribution of Mosquitoes in North America, by H. G. Dyar (pp. 686, 687).

Proceedings of the First International Entomological Congress (1. Cong. Internat. Ent. Brussels, 1 (1910), pp. 277, pls. 5; 2 (1910), pp. 520, pls. 27).—Among the papers of interest to the economic entomologist, all of which are in the second volume, are the following: "Springtails" (Collembola): Their Economic Importance, with Notes on Some Unrecorded Instances of Damage, by F. V. Theobald (pp. 1-18); The Calliphorine Cutaneous Parasites of Domestic Animals, by L. Gedoelst (pp. 19-28); The Control and Disinfection of Imported Seeds and Plants, by D. Morris (pp. 33-40); The Distribution of the Yellow Fever Mosquito (*Stegomyia fasciata*) and General Notes on Its Economics, by F. V. Theobald (pp. 145-170); Destruction of Mosquitoes by Small Fish in the West Indies, by D. Morris (pp. 171, 172); *Sphenoptera lineata* (geminata) and the Larva of a Lepidopteron which Attacks the Sulla (*Hedysarum coronarium*) in Tunis and Sicily, by T. de Stefani Perez (pp. 185-194); The Influence of Röntgen Rays on the Development of Lepidoptera, by K. Hasebroek (pp. 195-198); Ants and Their Hosts, by H. Donisthorpe (pp. 199-208); Ants and Their Guests, by P. E. Wasmann (pp. 209-234); Notes on Distribution and Ecology of North American Jassidae, by H. Osborn (pp. 235, 236); The Polycetidae and Their Adaptation to a Parasitic Life, by G. Horvath (pp. 249-256); Preliminary Notes on the Importance of the New Family Urethripidae in the Study of the Thysanoptera, by R. S. Bagnall (pp. 283-288); Notes on the Cestridae, by G. H. Carpenter (pp. 289-294); The Utilization of Insects, Particularly the Coleoptera, in Zoogeographic Questions, by J. Sainte-Claire Deville (pp. 305-312); Observations on the Lepidopterous Enemies of the Cotton Plant in Egypt and Method of Combating Them, by A. Andres (pp. 317-320); A Note on Methods of Preserving Insects in Tropical Climates, by F. M. Howlett (pp. 357-360); The Conservation of Types, by W. J. Holland (pp. 361-368); Mimicry, by F. A. Dixey (pp. 369-384); One Hundred Years of Entomology in the United States, by H. Skinner (pp. 425-432); The Nidification, Biology, and Parasites of Some Hymenoptera, by R. G. Mercet (pp. 457-464); Progress and Economic Entomology in India, by H. Maxwell-Lefroy and F. M. Howlett (pp. 465-482); and Economic Entomology in Trinidad, by F. W. Ulrich (pp. 509-516).

Insects injurious to corn, D. T. FULLAWAY (*Hawaii Sta. Bul.* 27, p. 20, figs. 8).—While the importance of corn and other cereals in Hawaii has gradually waned, especially of late years, due to the losses occasioned by cutworms and other pests which have increased enormously with the depletion of the golden plover, it is thought that with the control of the cutworm the cultivation of corn will increase from year to year.

The insects mentioned as attacking corn include wireworms, cutworms, army worms, plant lice, leaf hoppers, defoliating caterpillars, earworms, and grain feeders. Two species of wireworms, namely, *Simodactylus cinnamomeus* and *Monocrepidius exsul*, have been observed commonly about corn plantations. The commoner species of cutworms attacking corn are *Agrotis ypsilon*, *A. crinigera*, *Cirphis unipuncta*, and *Spodoptera mauritia*. The most important natural enemies of cutworms are the tachinid flies *Frontina archippivora* and *Chetogaster monticola*, *Ichneumon koebeli*, and birds, especially the mynah, golden plover, and Chinese pheasant.

Aphis maidis is the species commonly found on corn, sorghum, and other cereals. "Aphids have many natural enemies, which tend to keep them in check and at times render them innocuous, notably the ladybird beetles *Coccinella repanda*, *C. abdominalis*, *Platymus lividigaster*, *Scymnus notosoma*, and *S. vividus*, the syrphid fly *Xanthogramma grandicornis*, the *Leucopis grandicornis* (Fam. Agromyzidae), and minute internal parasites—cynipids, chalcids, and braconids. A small black encyrtid first noticed by Mr. Swezey in 1906,

is parasitic on *Aphis maidis*. It has been propagated by the writer for several months and is found to be highly efficient. In several lots examined, about 90 per cent of the plant lice had succumbed. . . .

Corn is almost invariably attacked by a small leaf hopper, *Peregrinus maidis*, which is often so abundant on small plants as to effect a rapid withering of the plants and ultimately their complete destruction. The injury they do results from their draining the leaves of sap and slitting the midrib for the insertion of their eggs. The secretive habits of these leaf hoppers makes it very difficult to control them by artificial means." Little success has been had in the control of the leaf hopper with the use of sprays.

Plusia chalcites is especially injurious to young plants and *Amorbia emigratella*, a leaf roller, is found on plants in all stages of growth. Neither of these is considered particularly destructive to corn, since they are both very general feeders. *Batrachodra rileyi*, *Cryptoblabes aliena*, nitidulid beetle larvae, and the coffee bean weevil (*Aracercus fasciculatus*) commonly infest the ears of corn. The Angoumois grain moth and the rice weevil are said to be the most important enemies of stored grain.

Insect notes, H. A. BALLOU (*Agr. News* [Barbados], 11 (1912), Nos. 270, pp. 282, 285, fig. 1; 271, p. 298, figs. 4).—The author reports observations made during the course of a trip to St. Kitts to study the insect enemies of sugar cane. The first paper discusses the injury to cane caused by *Termes flavipes*; the second discusses *Lachnostruma patruelis*, which occurs in considerable numbers, and a new root borer that is also quite common.

Insects injurious to mushrooms, C. H. POPENOE (*U. S. Dept. Agr., Bur. Ent. Circ.* 155, pp. 10, figs. 7).—The insects which more commonly attack mushrooms are maggots, mites, springtails, and sowbugs, the first mentioned being the most generally injurious. The mycetophilids *Sciara multiseti* and *S. agraria* and the phorid *Aphiocheta albidihalteris* are the species attracting the most attention as pests. In combating these maggots measures should be undertaken early in the season which will eliminate them from the mushroom house and prevent their subsequent entrance. They may be prevented from gaining entrance in manure from compost beds by heating to a temperature of 150° F. Fumigation with bisulphid of carbon just previous to planting the mushrooms is also productive of good results in destroying the maggots in the compost. Fumigation with tobacco is one of the best methods of destroying the adults.

The mushroom mite (*Tyroglyphus lintneri*) at times becomes so abundant in mushroom beds as to cover the surface of the compost and when present in such numbers is extremely destructive, feeding upon the mushrooms in all stages and penetrating the beds and destroying the mycelium. It is thought to be the cause in many cases of the failure of the spawn to grow. Besides the injury to the mycelium they cause damage to the fruiting bodies by eating into them, distorting or destroying the young growth. Under certain conditions the hypopus or migratory stage of this mite is produced. By means of sucking disks on the ventral surface of the body it attaches itself to insects and is transported to suitable breeding grounds in other localities, resulting in its appearance in localities far from previously infested beds. This mite may also obtain access to mushroom houses in infested compost or in spawn from infested houses. It is but little affected by fumigants suitable for the control of other mushroom pests, and the only measures applicable appear to be those of prevention. A predaceous mite belonging to the Gamasidae frequently occurs in beds infested by the mushroom mite, feeding upon the latter and at times becoming so numerous as to entirely wipe out the pest.

Springtails (*Achoreutes armatum*), which are present in almost all manure, where they feed on the decaying vegetation present, at times become quite injurious in mushroom houses. Mention is made of an outbreak of this pest in St. Louis, Mo., in which a bed 150 ft. in length was completely destroyed. Fumigation with hydrocyanic-acid gas at a strength of from 3 to 6 ounces to each 1,000 cu. ft. of air space will reduce their numbers without injuring the mycellium.

Two species of sowbugs, the greenhouse pillbug (*Armadillidium vulgare*) and dooryard sowbug (*Porcellio levis*), may become the source of injury, through their attacks on the caps or fruiting bodies of the mushrooms. The remedies mentioned include hand picking, pouring hot water along the cracks in the boards and in other places where the bugs may be concealed by day, and treatment with sulphur dioxide after the mushroom crop has been harvested and the compost removed. The plastering of the wet surface of cut potatoes with Paris green and laying them about on the beds is frequently successful in entirely ridding the houses of this pest. Certain crickets are also said to eat into the caps of the mushrooms, *Ceuthophilus pacificus* being mentioned as causing extensive injury to cultivated mushroom beds on the Pacific coast.

In summarizing the circular the author calls attention to the fact that the building should be as tight as possible with few outlets and screened with fine wire gauze.

The leopard moth and other insects injurious to shade trees in the vicinity of Boston, J. W. CHAPMAN (*Cambridge, Mass.: Harvard Univ., 1911, pp. 51, pls. 7*).—This paper, consisting of 3 parts, is based upon the studies conducted by the author in large part in the college yard of Harvard University.

Part 1 (pp. 6-29) is devoted to the leopard moth (*Zeuzera pyrina*), its history, descriptions of its stages, life history and habits, economic importance, natural enemies, and suggestions in regard to control, with a bibliography of 31 titles. In combating the pest the author finds pruning and the cutting back of all infested parts to be very effective if the larvæ have not secured too great a hold on the trees and can not be reached individually with applications of carbon bisulphid or through the use of a wire. This is said to be most effective where the young larvæ are just beginning to show in the twigs and tips of small branches which wilt and die. They can be successfully reached by a pair of hooks such as are ordinarily used to remove the nests of the brown-tail moth. The author reports having taken 300 larvæ in this manner from a single elm. Bisulphid should be used, if possible, in all cases where the larvæ can not be reached by use of a wire. Other substances besides putty and grafting wax which may be used for stopping the holes are clay, coal tar, and in some instances a wooden plug driven into the hole and then sawed off close to the bark. The pupa, like the larva, can be destroyed by a wire, carbon bisulphid, or by simply closing the opening to the outside. Since the moths are attracted to light, a large number may be destroyed in this way.

In part 2 (pp. 30-40) the author describes and discusses the life history and habits, economic importance, etc., of the elm bark-beetle (*Eccoptagaster multistriata*), a preliminary account of which has been previously noted (*E. S. R.* 23, p. 564). A bibliography of 22 titles is included.

In part 3 (pp. 41-45) brief notes are given on the carpenter moth (*Priocorystus robinæ*), elm-bark borer (*Hylesinus opaculus*), elm-leaf miner (*Caliofenusa ulmi*), elm-leaf beetle (*Galerucella luteola*), oyster-shell bark-louse, San José scale, white-marked tussock moth, elm-gall louse (*Colopha ulmicola*), woolly elm-tree louse (*Schizoneura rileyi*), and brown-tail moth. In an appendix food plants of the leopard moth are listed by families.

A manual of Philippine silk culture, C. S. BANKS (*Mandia: Bur. Sci., 1911, pp. 53, pls. 20*).—This work collates all the data accumulated during the 6 years that the Bureau of Science has propagated mulberry silkworms in the Philippine Islands, with a view to making them accessible to persons who desire to enter upon the commercial production of silk.

Cutworms and army worms, A. GIBSON (*Canada Dept. Agr., Div. Ent. Bul. 3, 1912, pp. 29, pl. 1, figs. 10*).—The first part of this bulletin deals with the nature of cutworm injuries, their life history, natural enemies, and preventive and remedial measures. The more common species of cutworms, namely, the red-backed cutworm (*Buxoa ochrogaster*), the greasy or black cutworm, *Agrotis ypsilon*, the variegated cutworm (*Peridroma saucia*), the dark-sided cutworm (*E. messoria*), the white cutworm (*E. scandens*), the W-marked cutworm (*Noctua clandeatina*), the spotted cutworm (*N. c-nigrum*), the glassy cutworm (*Hadenia devastatrix*), the yellow-headed cutworm (*H. arctica*), the clover cutworm (*Mamestra trifolii*), the dingy cutworm (*Feltia ducens*), the army worm (*Heliothia unipuncta*), and the black army worm (*N. fennica*) are then dealt with.

It is stated that many new and hitherto unpublished observations on the life histories of several species are recorded.

The present outbreak of the fall army worm and recommendations for its control, JAMES WILSON (*U. S. Dept. Agr., Office Sec. Circ. 49, pp. 2, fig. 1*).—This circular calls attention to the fact that *Laphygma frugiperda*, which has been present in unprecedented numbers from Louisiana and Arkansas eastward to the Atlantic Ocean and destroyed corn, cotton, sugar cane, rice, and other crops, can be best controlled by the application of arsenical poisons and the working of the soil.

The present outbreak of the grass worm or fall army worm and recommendations for its control, JAMES WILSON (*U. S. Dept. Agr., Office Sec. Circ. 49, rev., pp. 4, figs. 3*).—This is a revision of the circular noted above.

Damage to sugar-cane juice by the moth stalk-borer (*Diatrea saccharalis*), D. L. VAN DINE (*Porto Rico Sugar Growers' Sta. Circ. 1, pp. 11*).—This circular deals with the effect of the borer injury on the sucrose content and purity of the juice of infested stalks, and reports comparative analyses of sound and borer-infested stalks of cane.

The author finds that "there is a direct loss in sugar and a decided reduction in the purity of the juice of cane infested by the moth stalk-borer. This loss in Porto Rico exceeded 870 lbs. of sugar per acre of cane in which the infestation was not apparent except upon examination, the yield averaging 41 tons of cane per acre and the stalks being normal and healthy in appearance. The loss increases in direct proportion to the number of joints of the cane stalks infested by the borer. There is more fiber and less juice in borer-infested cane. The actual weight of borer-infested cane is less than that of sound cane, and it is considered that the juice deteriorates more rapidly in infested cane when cane is allowed to stand without being crushed for any length of time after harvest."

The "wilt disease," or "flacherie," of the gipsy moth, W. REIFF (*Boston: State Forester, 1911, pp. 60, pls. 2, figs. 5*).—In part 1 (pp. 7-12) a brief account is given of caterpillar diseases in general. Part 2 (pp. 12-14) consists of a brief résumé of experiments with flacherie in 1909, an account of which has been previously noted from another source (*El. S. R., 22, p. 357*). Part 3 (pp. 14-52) reports the details of flacherie experiments conducted in 1910.

In the course of the work artificially developed flacherie was planted after the dying off of the breeding material had begun among the gipsy moth cater-

pillars in 12 separate localities. By taking the average of these results it was found that the total number of apparently living eggs had been decreased by introduction of the artificially developed flacherie to about 14 per cent.

The "experiments prove conclusively that flacherie has an injurious influence upon the prosperity of the gipsy moth caterpillars, this influence varying according to the manner and time of the appearance of the disease. There was no difference noticed in the progress of the wilt which broke out naturally and that of the artificially developed flacherie. The latter, however, is probably the more important factor, for with its help we may be able to introduce the disease among caterpillars of localities in which the wilt, perhaps, would not make its appearance naturally. . . . In selecting the localities in which the disease is to be introduced it is unimportant whether the caterpillars of the gipsy moth are present in large or small numbers. . . . Wherever the naturally as well as the artificially developed flacherie occurs the female caterpillars will always succumb to it more readily than the male."

Studies on the wilt disease, or "flacherie" of the gipsy moth, R. W. GLASER and J. W. CHAPMAN (*Science, n. ser.*, 36 (1912), No. 920, pp. 219-224).—The authors, who have been engaged for several months in the study of the cause and nature of the wilt disease of gipsy moth caterpillars, have found polyhedral bodies clustered about their tracheæ analogous to those which have been found in the silkworm and nonne (*Lymantria monacha*) caterpillars. These bodies have a very high refractive index and resist all stains with the exception of iodine, in which they take on a uniform tint. By using a high magnification small wriggling organisms were observed in the fat cells and other cells at such times as the polyhedral bodies were clustered around the tracheæ. "These moving organisms were stained and found to be bacteria. From this time on we pursued the work along bacteriological lines and we believe have been able to demonstrate the etiological connection of these bacteria with the disease." They were found in great numbers in all parts of the intestine and in many caterpillars appeared to be in the act of perforating its walls. "The fat cells seem to be particularly liable to attack, which probably accounts for the saponified nature of the fat of sick caterpillars. . . . The organism in question is very small, having a diameter of only 0.51 to 0.85 μ It resembles the pneumococcus very closely except that it is motile, progressing in a gyrating manner. For this reason and because it seems to be an undescribed form, we have named it Gyrococcus."

In inoculation experiments 10 caterpillars out of 12 inoculated in the prolegs succumbed to the disease. Two out of the 10 died in the pupal stage, while of the 2 surviving 1 was still in the pupal stage at the time of writing and 1 had emerged. Ten of the 12 inoculated in the dorsal vessel died and the remaining 2 were still pupæ. All of the deaths are said to have been typical of flacherie. The 2 lots used for feeding experiments all died without a single exception. In order to exclude the possibility of having inoculated an ultraviable virus together with the Gyrococcus, a large number of caterpillars were prepared (blood tested) for inoculation and feeding with material passed through the Berkefeld filter. These all survived while those treated in the same manner with the unfiltered culture all died.

"The disease is probably spread in nature by the juices of disintegrated caterpillars flowing over the leaves which are later eaten by others. We have found Gyrococcus in the feces, and the fact that such excretions are washed over the leaves by rain seems to show that the disease may also be spread in this manner. What economic value the flacherie-disease may have in combating the gipsy moth, we are not prepared at present to say. We have no

experimental evidence whatsoever that the disease may be air borne, as claimed by Mr. Reiff, although of course we do not wish to exclude such a possibility."

The paper concludes with a brief description of the new organism, *Gyrococcus foveolatus* n. g. and n. sp.

Studies of the wipfelkrankheit of the nonne moth, K. ESCHERICH and M. MYLSTROM (*Naturw. Ztschr. Forst u. Landw.*, 9 (1911), No. 9, pp. 381-402, figs. 6).—This article first briefly reviews the subject and discusses its diagnosis, then

reports observations and experiments on the transmissibility of the virus of wilt disease in nun moth caterpillars, the course of the disease, and nature of the virus.

The Mycetophilidæ of North America, Part IV, O. A. JOHANSEN (*Maine Sta. Bul.* 200, pp. 57-146, pls. 7).—In this fourth paper (*E. S. R.*, 27, p. 57) the species of the remaining genera of the subfamily Mycetophilinæ are characterized together with those of the subfamily Sclariinæ. "The members of the former so far as known injure mushrooms only; the latter constitute the most important group so far as the agriculturist is concerned.

"Though occasionally reported as injuring mushrooms the members of the Sclariinæ are not as a rule regarded as serious pests of the fleshy fungi, differing in this respect from the species of the other subfamilies. After partial decay of fungus growths, however, larvæ of Sclara are found in abundance, and it is this fact which, in some cases at least, has led observers and growers to attribute the destruction to these gnats when in all probability the injury was caused by species of Mycetophila, Exechia, or Phorids. On the other hand there is no lack of evidence of the harmful character of some species of Sclariinæ to seed corn, to potatoes, to wheat, and to the roots of other plants."

The biology of the cockchafer (*Terre Vaud.*, 3 (1911), No. 50, pp. 453-455, fig. 1; abs. in *Internat. Inst. Agr. [Rome]*, *Bul. Bur. Agr. Intel. and Plant Diseases*, 3 (1912), No. 2, pp. 572-574).—This paper presents a brief account of work carried on by Decoppet, who has conducted studies at Farzin, in the Canton of Vaud, Switzerland, in a region where the farm and forest injuries caused by the pest are often very great, the roots and foliage of seedlings and trees (pine, spruces, larches, and silver firs), grasses, and some field crops being attacked.

The action of carbon disulphid on cockchafer larvæ and on the growth of some forest trees, DECOPPET (*Bul. Soc. Vaud. Sci. Nat.*, 5, ser., 48 (1912), No. 176, pp. XXXV, XXXVI; abs. in *Internat. Inst. Agr. [Rome]*, *Bul. Bur. Agr. Intel. and Plant Diseases*, 3 (1912), No. 6, pp. 1456, 1457).—The author found that carbon disulphid at the rate of from 1 to 1½ oz. per square yard injected into 6 or more holes considerably diminished the injury caused by white grubs. In some of the experiments conducted the loss due to their attack in beds thus treated was reduced to 1 or 2 per cent, although it amounted to 20 per cent at the commencement and 80 per cent in untreated beds. Carbon disulphid also has a beneficial effect in stimulating the growth of vegetation.

The author concludes that the "application of carbon disulphid should become a regular practice in forest nurseries; it will not destroy all the white grubs in the soil, but will greatly reduce their number, thus permitting the plants to make new roots; and owing to the effect of the disulphid, the absorption of assimilable substances in the soil is increased, as is shown by the increased power of resistance possessed by the young trees. The disulphid must be injected into the soil as uniformly as possible, at the rate of 1 to 1½ oz. per square yard in 6 to 8 holes. Ground recently broken up should not be treated,

and some days should elapse after the application of the disulphid before plowing. Further, the soil must be neither too damp nor too dry. As the disulphid vapor sinks in the soil it must not be injected to a depth of over 6 in."

The destruction of the cockchafer in the forest nursery, DECOFFET (*Schweiz. Ztschr. Forstw.*, 63 (1912), No. 4, pp. 122-129, pls. 2, fig. 1).—This is a more detailed account of the investigations noted above, which have been under way since 1904.

The white grub of sugar cane in the island of Mauritius, A. VUILLET (*Sucr. Indig. et Colon.*, 80 (1912), No. 11, pp. 253-255).—This is a résumé of the present knowledge of the scarabæid *Phytalus smithi* and the means of combating it.

The control of the boll weevil, W. D. HUNTER (*U. S. Dept. Agr., Farmers' Bul.* 500, pp. 14).—The matter contained in this publication is extracted largely from Bulletin 114 of the Bureau of Entomology, previously noted (*R. S. R.*, 27, p. 562). It contains a brief outline of the methods which have been tested under various conditions and sums up the present available knowledge concerning the subject of control.

The honeybee, a guide to apiculture in Canada, C. G. HEWITT (*Canada Dept. Agr., Div. Ent. Bul.* 2, 1912, pp. 45, pls. 2, figs. 14).—This bulletin furnishes information for the practical beekeeper.

A revision of the Ichneumonidae based on the collection in the British Museum, with descriptions of new genera and species, C. MORLEY (*London, 1912*, pt. 1, pp. XI+88, pl. 1).—The present work, which deals with the tribes Ophionides and Metopiides, is said to be the commencement of a revision of the family Ichneumonidae. Five genera and many species are described as new to science.

The ichneumon flies of America belonging to the tribe Ophionini, C. W. HOOKER (*Trans. Amer. Ent. Soc.*, 38 (1912), No. 1-2, pp. 176+176a-176c, pls. 3).—This revision of the Ophionini is based upon extensive museum and private collections, all but 4 of the types existing in America having been examined. Most of the species attack lepidopterous larvæ, including the army worm, cotton worm, zebra caterpillar, the large *Cecropia* larvæ, etc. *Ophion bifoveolatus*, however, apparently confines itself to the larvæ of *Lachnosterna*. Synonymic lists are given of the genera and species. A number of species are described as new to science.

The clover mite (*Bryobia pratensis*), F. M. WEBSTER (*U. S. Dept. Agr., Bur. Ent. Circ.* 158, pp. 5, figs. 3).—This is a summarized account of the clover or brown mite. This pest attacks the leaves of clover, grasses, and fruit and other trees, feeding upon and often destroying them. In addition, during winter and spring it frequently swarms in dwellings, often crawling about in myriads over windows, furniture, pictures, curtains, etc. As a whole, throughout its known area of distribution, it is probably of more importance to the fruit grower than to the farmer. While east of the semiarid region it is found largely on clover and blue grass, it is at present largely an orchard pest west of about longitude 100°. "With the possible exception of Georgia, the pest seems to occur generally over the whole country, except perhaps in the Gulf States and the Dakotas, though just why it should not be found even there can not now be explained."

Caterpillars of *Tineola bisellella*, one of the common clothes moths, have been observed to feed upon the eggs of this mite. A minute black lady beetle (*Scymnus punctum*) and lace-winged flies are also recorded as predaceous enemies.

Frequent reference is made to the investigations conducted by the Colorado Station, previously noted (*R. S. R.*, 23, p. 264).

List of insecticide dealers, C. W. WOODWORTH (*California Sta. Circ. 79, pp. 23*).—This circular lists the firms which have been licensed to sell insecticides and fungicides in California for the year ending June 30, 1913.

FOODS—HUMAN NUTRITION.

Practical suggestions for the preparation of frozen and dried eggs, MARY R. PENNINGTON (*U. S. Dept. Agr., Bur. Chem. Circ. 98, pp. 12, pls. 3, fig. 1*).—A study of the fundamental facts underlying the problem of the preservation of eggs and egg products.

Examinations of eggs which had been commercially candled for breaking were made at different times at 6 different factories. The appearance, odor, and sometimes the taste of the egg when removed from the shell were added to the candler's description. Laboratory examinations were made to determine the number of bacteria present, and whether or not the organisms were of the colon type. The amount of nitrogen obtained from the eggs was analyzed according to the Folin aeration method.

With the exception of the eggs having green-colored whites, musty eggs, sour eggs, and eggs with a pronounced odor which the candler can not always distinguish, the eggs going to the breakers after careful handling were found to be, bacteriologically speaking, a clean, wholesome food. The eggs, however, were handled under very different conditions and the product varied greatly in bacterial content, although the percentage of loosely combined nitrogen did not vary to any great extent.

The bacterial content of egg products was proved to be largely a matter of handling, because there was a wide variation between the output of the different plants, and when eggs used by all of them were opened in a laboratory under aseptic conditions they were found to contain but few bacteria. Conversely, when they were opened in the laboratory according to methods prevailing in egg-breaking establishments, the product sometimes approximated closely that obtained in a commercial establishment. The fingers of the breaker were found to be one prolific source of trouble, as they are constantly wet. The dishes used were found to be another source of contamination, and in order to overcome this an improved egg-breaking outfit is illustrated and described. Suggestions are also offered for the construction of a suitable room for egg breaking, so that bacterial cleanliness may be preserved.

"Arrangements should be made for washing and sterilizing utensils outside of the breaking room. All eggs should be chilled at a temperature below 40° F. for 24 hours, as soon as received, candled in a chilled candling room (not above 60°), and transferred as soon as candled to the breakers. The liquid egg should go at once, preferably while the temperature is below 45°, in its ultimate containers, to a quick freezer. This necessitates a low-temperature room on the premises. . . . It is believed that, properly conducted, the freezing and drying of eggs is an industry which is economically desirable, as long as the centers of egg production and egg consumption are so widely separated, and as long as the poor handling methods bring to the concentrators of the producing sections such enormous numbers of eggs that are wholesome but not available for long hauls."

Oats in human nutrition, PLUCHET and NIVIOR (*Bul. Soc. Nat. Agr. France, 72 (1912), No. 7, pp. 586-591*).—Attention is called to the advantages which, in the authors' opinion, oats possess as food for man, and to experiments by Moreau of the French Army which appear to indicate that the addition of oats in some form or other to the ration increases the endurance of soldiers

Mention is made of a kind of bread made in Norway and Sweden of oatmeal mixed with ground pine bark.

Rice (*Cuba Mag.*, 4 (1912), No. 2, pp. 77-80).—A discussion of the use of rice, with a collection of recipes, a number of them for Cuban dishes.

Bacterial changes in bread, E. KATZER (*Bul. Soc. Sci. Hyg. Aliment.*, 1 (1911), No. 3-4, pp. 349-357).—These experiments were made to ascertain the cause of viscosity and ropiness in bread and to discover a remedy for it.

It was found that the micro-organism (which is described) may be introduced in the yeast, the water, the milk, or the flour. To prevent the bread from spoiling the following remedies are suggested: Cleanliness, including washing the dough trough and other baking utensils with boiling acidulated water; addition of from 1 to 2 liters of vinegar to each 100 kg. of flour, or the addition of some form of lactic acid to the dough; in severe cases, changing the flour, the yeast, the milk, or using boiling water; and baking for a considerable time, 30 minutes being required for a 500-gm. loaf.

The cause and prevention of other defects in bread caused by micro-organisms and similar topics are discussed.

Bacterial changes in bread, E. KATZER and H. DELAVAL (*Ann. Inst. Nat. Agron.*, 11 (1912), 2. ser., No. 1, pp. 143-153, fig. 1).—See above.

A study of ropy bread, ANNA W. WILLIAMS (*Biochem. Bul.*, 1 (1912), No. 4, pp. 529-534).—Experiments made to determine the cause of ropiness in bread and to devise preventive measures are reported.

The trouble was found to be due to the presence in the flour of a short, thick, sluggishly mobile, rod-bacillus having a capsule. The infected flour may also contain a coccus which produces a pink crumb, preceded by a characteristic odor of rope. The development of ropiness may be prevented by keeping the bread dry and at low temperature. Thin dough and underbaking favor the rapid development of ropiness, while buttermilk used in mixing the dough will tend to hinder the development.

Increased cost of living and the use of food pastes, E. JACQUET and G. ROVESTI (*Bul. Soc. Sci. Hyg. Aliment.*, 1 (1911), No. 3-4, pp. 358-370).—Increased use of food pastes such as macaroni is recommended as a means of reducing the cost of living. Analyses of these pastes are presented, and it is noted that the better grades contain a relatively high proportion of ash, fat, and cellulose, but less nitrogenous matter than the cheaper grades. Consideration is given to the selection of wheat, the drying of the paste, criteria of the quality of paste, kinds of paste, and trade statistics. Suggestions are given for increasing the use of this sort of food.

Soy bean and condensed milk (*Med. Rev. of Reviews*, 18 (1912), No. 8, p. 513).—In this summary of data a combination of the soy bean or its flour with sweetened condensed milk is recommended as an infant food as a substitute for fresh milk when the latter is not safe. The soy bean is valuable also in the treatment of diabetes on account of the absence of starch. Its flour is said to contain 44.6 per cent protein, 19.4 per cent fat, and 9.3 per cent cane sugar.

The caloric estimation of percentage-mixtures of milk, F. G. ORRENHEIMER (*Med. Rev. of Reviews*, 18 (1912), No. 9, p. 645).—Fraley's method is cited which makes use of the formula $2F + S + P \times 1\frac{1}{2} Q = C$, in which F represents the percentage of fat, S of sugar, P of protein, Q the quantity in ounces, and C the caloric value.

A nutrition investigation on the insoluble carbohydrates or marc of the apple, E. C. SCHNEIDER (*Amer. Jour. Physiol.*, 30 (1912), No. 3, pp. 253-270).—The results of studies are reported of the composition of the apple and

apple marc, bacteria, enzymes, digestion, and utilization, and data reported by other investigators are summarized.

According to the author, 35.87 per cent of pentosan and 45.83 per cent of galactan were obtained from the marc by hydrolysis with hydrochloric acid, intestinal bacteria destroyed the hemicelluloses of the marc and pectin, as well as the pentosan and galactan of the pectin, and did not form reducing sugars as an end product. Neither the marc nor its pectin was hydrolyzed by animal enzymes, malt diastase, or "taka" diastase. Weak solutions of hydrochloric acid split off from the marc pectin and reducing sugars. In digestion experiments made with human subjects from 79.1 to 84.5 per cent of the hemicelluloses of the marc was utilized or destroyed, probably by bacterial activity. Of the pentosan 88.69 per cent was digestible, and of the galactan 76.78 per cent.

Official inspections (*Maine Sta. Off. Insps.* 37, pp. 13-24; 39, pp. 73-88; 40, pp. 39-100).—The first of these publications reports the results of the examination of a number of samples of carbonated beverages and ice cream; the second reports results of the examination of a number of miscellaneous food materials, and discusses sanitary food and related topics; and the third, the results of the examination of drugs.

Food inspection decision (*U. S. Dept. Agr., Food Insp. Decisions* 146, 147, pp. 1 each).—These decisions have to do with the use of saccharin in foods, and with absinth.

School lunches and medical inspection, I. S. WILE (*Med. Rev. of Reviews*, 18 (1912), No. 9, pp. 593-598; *Jour. Home Econ.*, 4 (1912), No. 4, pp. 345-352).—Arguments favoring the school lunch are presented in this summary of data, which includes the author's experience in school lunch work in New York City.

Cost of living in Mexico, P. E. HOLLAND and W. L. BONNEY (*Daily Cons. and Trade Rpts.* [U. S.], 15 (1912), No. 199, pp. 966-969).—Statistical data relating to the cost of living, and a description of the preparation of some Mexican dishes (tortillas, tamales, and enchiladas), are given.

Food in Syria, M. LABBÉ and J. ZIADE (*Bul. Soc. Sci. Hyg. Aliment.*, 1 (1911), No. 3-4, pp. 371-381).—A detailed description of the foods generally consumed in Syria is given.

The results of dietary studies are presented. In the case of a man weighing 85 kg. the daily food supplied from 138 to 147 gm. protein, the energy value being from 2,878 to 3,087 calories. In another case, with a man weighing 105 kg. the diet supplied about 228 gm. protein and 5,486 calories; and in a third case, with a man weighing 70 kg., 125 gm. protein and 3,848 calories.

According to the author's data, Syrian diet contains little meat and practically no alcohol. It contains large quantities of carbohydrates, and, they believe, supplies too much fat.

The pathology of fat metabolism, F. M. HANES (*Bul. Johns Hopkins Hosp.*, 23 (1912), No. 253, pp. 77-82; *abs. in Med. Rev. of Reviews*, 18 (1912), No. 6, p. 412).—"Fatty degeneration" is an inexact term for a variety of cell injuries accompanied with the appearance of fat.

Lipins (lipoids) of cells include not only neutral fats, fatty acids, and soaps, but also more complex substances which should be studied in connection with both normal and abnormal metabolism. Lipins are constant cell constituents, usually in invisible form, becoming visible with certain injuries to the cell, and forming fatty accumulations of lipins which the cell can not utilize and which are not the result of degenerative transformation of the cytoplasm into fat. These accumulations are physiological or pathological infiltrations. Glycerylester infiltration indicates injury to the containing cell, and cholesteryl-ester

infiltration indicates necrobiosis of neighboring cells. Chronic degenerative lesions produce cholesteryl-ester infiltration. Autolysis causes the invisible lipins of the cell to assume a visible form, differing from the lipins deposited in the cell during life. This process (myelinic decomposition) is not related to the process of fatty infiltration.

* The influence on the respiratory exchange of varying amounts of carbohydrate in the diet, F. G. BENEDICT and H. L. HIGGINS (*Amer. Jour. Physiol.*, 30 (1912), No. 3, pp. 217-232, *dgm.* 1).—In these experiments diets supplying uniform amounts of protein and approximately the same number of calories but with varying amounts of carbohydrates and fats, were fed to several individuals, and during 4 days measurements of the gaseous metabolism, particularly the respiratory quotient, were made.

It was found that with the diet unchanged on the preceding evening the respiratory exchange of any individual the next morning before eating is always the same. With normal subjects the same diet gives the same respiratory quotient the morning after a meal. A distinct relation was found between the supply of body carbohydrate (measured by the respiratory quotient after digestion has ceased) and the quantity of carbohydrate in the preceding diet. In men of sedentary habits even 600 gm. of carbohydrate daily for 4 days did not produce glycosuria.

The influence upon metabolism of nonoxidizable material in the intestinal tract, F. G. BENEDICT and L. E. EMMES (*Amer. Jour. Physiol.*, 30 (1912), No. 3, pp. 197-216).—These experiments were made in the attempt to determine whether the increase in metabolism (measured by oxygen consumption and carbon dioxide elimination) following ingestion of food is caused principally by the presence of oxidizable material in the blood or by muscular work involved in the process of digestion. Respiration apparatus previously described (*E. & R.*, 21, p. 665) was used.

In 6 experiments the subject took a dose of 15 gm. of sodium sulphate in 200 cc. of water. No considerable increase in either oxygen or carbon dioxide was noted, in spite of the intense peristalsis produced. Hence, the authors conclude, it is erroneous to cite the results of earlier experiments in support of the idea that intestinal movements have a very considerable effect upon total metabolism.

Seven experiments were made in which the subjects ingested considerable quantities of agar-agar, either dry or in the form of a jelly. None of this material, except a very little carbohydrate, is absorbed. No increased metabolism due to increased segmentation was noted, and the movement along the intestines of the material did not appear to require the expenditure of a measurable amount of energy. "It would therefore appear that the 'work of digestion,' in so far as either peristalsis or possibly the segmentation process is concerned, can not be of sufficient moment to play an important rôle or to explain in any degree the marked rise in metabolism so frequently noted after the ingestion of various food materials."

The physico-chemical basis of striated-muscle contraction, I. W. N. BEE (*Biochem. Bul.*, 1 (1912), No. 4, pp. 535-537).—This is a criticism of the Zauth theory of muscle contraction.

Studies of the animal body as a prime mover, M. RINGELMANN (*Bul. Soc. Sci. Hyg. Aliment.*, 1 (1911), No. 3-4, pp. 337-348, *dgm.* 3).—This is an attempt to devise a method for measuring the power obtained from man or the lower animals, in the same way that an engineer determines the power of a prime mover. The analogy between the animate and inanimate machines is carried out in considerable detail, and formulas are presented for the measurement of

the force, speed, and power of the animate machine, just as there are formulas for determining these attributes in the case of an inanimate machine.

Experiments with cattle showed a relation between the effort of an animal and its weight, and between its effort and the dimensions of certain muscles. The speed of the animate motor is affected by the length of the limbs, by the angular velocity at which the various levers move in a vertical plane, and by the number of movements in a unit of time.

If f represents the mean effort, P the weight of the motor, n the ratio of f to P , v the mean speed, H the height of the motor, n' the ratio of v to H , and fv the power of the motor, $fv = nm' (PH)$. Experiments demonstrate that f increases with P , while v increases to a maximum and then diminishes with increase in P . A graphic curve illustrates these relations. It may be possible to make the coefficients n and n' utilizable practically, their value depending on the age of the motor, or anatomical and physiological peculiarities, such as the dimensions of some parts of the animate machine, the frequency of respiratory movements or of the pulse, the temperature, etc.

In the experiments with cattle it was found that the maximum effort was about four times the mean, and the maximum speed about three times the mean.

If F equals the maximum effort, f the mean effort, a the ratio of f to F , V the maximum speed, v the mean speed, b the ratio of v to V , and m the utilizable power of the animate machine, $m = fv = (ab) FV$. Since a and b appear to be constants for animals of the same species, age, etc., the product of the maximum speed and effort of an animal is the measure of its utilizable power.

Other analogies between animate and inanimate machines are presented.

A new calorimeter bomb with special advantages as to material of construction and method of operation, S. W. PARR (*Jour. Indus. and Engin. Chem.*, 4 (1912), No. 10, pp. 746-748, figs. 4).—The advantages of the calorimeter here described are: It is constructed of a new alloy of nickel, copper, tungsten, and chromium, with smaller amounts of manganese, aluminum, titanium, boron, and silicon, the alloy being very much cheaper than platinum, equally resistant to acids, and far less liable to fracture than enamel; rubber gaskets are substituted for the usual lead ones, permitting the securing of a perfect seal with the minimum of compression, this substitution being possible through the devising of a method of construction which prevents burning of the rubber; an improved form of valve for the admission of oxygen and release of gases after combustion; and a simple and efficient method of fastening the cap and sealing the cover.

Some tests on a new calorimeter bomb, R. H. JESSE, JR. (*Jour. Indus. and Engin. Chem.*, 4 (1912), No. 10, pp. 748, 749).—An account is given of tests of the calorimeter bomb described above.

Tests with acids showed that the material of which the apparatus is constructed is sufficiently acid proof. Indirect proof indicates that the substitution of rubber gaskets for lead did not affect results, the amount of rubber exposed to the gases being a ring only 0.001 of an inch wide, and the gases being cooled by passing through a very narrow space between masses of cool metal before coming in contact with the rubber. No odor of burnt rubber was noted, and the constancy of the results was such as would hardly have been possible had any rubber at all been burnt. Tests with sugar showed that the apparatus is accurate within 0.07 per cent and tests with benzoic acid showed an accuracy within 0.04 per cent, which is as close an agreement as could be expected when temperatures are measured with a mercury thermometer, and which compares very favorably with the best work of electrical thermometers.

ANIMAL PRODUCTION.

Digestion experiments with Texas hays and fodders, G. S. FRAPS (*Texas Sta. Bul.* 147, pp. 5-28).—The average composition of feeding stuffs used in the digestion experiments reported in this bulletin was as follows:

Composition of Texas hays and fodders.

Kind of feeding stuff.	Water.	Protein.	Ether extract.	Nitro- gen-free extract.	Crude fiber.	Ash.
	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>
Alfalfa hay.....	10.99	16.17	1.41	34.96	28.34	8.14
Bermuda hay.....	9.74	6.43	1.60	46.70	27.62	7.80
Bur clover.....	9.73	23.43	2.12	31.83	20.81	12.16
Buffalo grass.....	7.30	7.05	1.20	45.43	27.64	11.55
Corn shucks.....	7.75	8.20	.93	54.60	30.33	3.47
Cowpea hay.....	12.73	14.93	3.02	34.37	25.13	9.05
Guam grass.....	7.66	8.43	1.73	40.40	23.00	8.79
Johnson grass hay.....	8.69	7.44	1.68	42.44	27.40	12.36
Do.....	8.06	6.92	1.40	44.73	30.76	8.13
Kafir fodder.....	8.57	9.90	2.13	44.33	22.90	11.53
Millet.....	9.42	4.22	1.62	48.37	27.01	8.97
Oat hay.....	8.36	8.04	2.41	44.22	27.37	9.06
Peanut hay.....	8.60	13.50	8.59	29.02	22.32	7.44
Para grass.....	8.36	3.44	.91	46.74	33.30	7.19
Rice straw (Japan).....	6.68	3.92	1.24	37.83	33.26	17.19
Rice straw (Honduras).....	7.46	3.98	1.15	40.62	30.45	16.16
Sorghum hay.....	10.56	5.58	1.66	47.24	28.07	6.91
Vetch hay.....	6.76	15.00	1.58	37.53	27.23	11.87

The bur clover was cut when in bloom with most of the seed corn and dried in a large air-drying apparatus in the laboratory before chopping. It was free from dirt and was readily and completely eaten. Samples of bur clover were also collected at various stages of growth and gave the following analytical results:

Composition of bur clover at different stages of growth.

Stage of growth.	Date collected.	Water.	Protein.	Ether extract.	Nitro- gen-free extract.	Crude fiber.	Ash.	Water lost in air-dry- ing.
		<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>
Just in bloom.....	Mar. 23	3.02	27.10	4.19	40.49	14.12	11.09	55.8
Full bloom, part of seeds formed..	Apr. 2	7.43	24.00	3.23	38.19	16.96	10.30	53.3
Most of seeds formed.....	Apr. 14	2.72	20.75	2.97	41.13	21.35	10.63	54.5
Still in bloom.....	Apr. 21	5.96	21.00	3.92	38.47	21.25	9.40	53.9
Part of leaves dy- ing, still blooming.	Apr. 28	5.95	16.43	2.48	40.70	25.59	8.65	73.6
All seeds formed, some leaves dy- ing.....	May 7	6.90	15.70	2.58	36.76	30.58	7.43	53.3
Most of leaves and buds dropping off.	May 20	7.05	11.01	1.84	33.43	33.25	8.59	54.7

The results of digestion experiments with sheep are given in the following table:

Coefficient of digestibility of Texas hays and fodders.

Kind of feeding stuff.	Protein.	Ether extract.	Nitro- gen-free extract.	Crude fiber.	Ash.
	Per ct.	Per ct.	Per ct.	Per ct.	Per ct.
Alfalfa hay.....	73.8	4.9	65.0	45.4	58.0
Bermuda hay.....	48.9	46.9	50.2	50.8	28.0
Bur clover.....	89.7	5.4	75.9	64.2	62.6
Buffalo grass.....	33.2	35.5	58.0	58.4	24.3
Orn shrubs.....	12.5	38.6	60.6	69.3	21.5
Cowpea hay.....	72.3	38.6	65.8	57.1	28.4
Guam grass.....	50.7	57.2	53.8	65.9	38.4
Johnson grass hay.....	41.0	52.2	52.3	67.1	43.6
Do.....	51.8	49.3	61.0	67.6	31.3
Leaf fodder.....	63.0	53.1	69.4	67.1	28.4
Millet.....	39.3	56.4	59.3	65.1	21.3
Out hay.....	58.5	68.9	66.8	67.8	25.2
Peanut hay.....	78.6	90.0	74.3	52.4	23.3
Para grass.....	9.9	45.0	46.9	60.3	25.2
Rice straw (Japan).....	16.8	6.4	45.0	60.3	25.2
Rice straw (Honduras).....	26.6	36.4	47.3	58.0	15.0
Sorghum hay.....	81.6	53.5	65.0	66.8	33.8
Vetch hay.....	74.2	42.4	74.5	54.5	28.3

Fodder crops of the Punjab, J. M. DOVIE ([1912], pp. II+31+VII, pls. 2).—This describes methods of feeding cattle and discusses the food value of native and introduced plants used as fodder for live stock.

Statistical investigations into the utilization of fodder crops and capital by means of live stock in various districts in Germany, F. WATERSTRADT (Arch. Exakte Wirtschaftsforsch., 4 (1912), No. 1, pp. 88-128; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 3 (1912), No. 6, pp. 1412-1418).—This is a study of 443 farms, in which the results are arranged according to the Thünen system in the order of progressive decrease of the income derived from cattle and other domestic animals, in order to determine by such means their relation to the total receipts of the farm and the factors of production.

From the results, which are prepared in tabular form, there seems to be a correlation between the income produced by cattle and the net and gross income of the farm. Because of this it is urged that more live stock be kept, provided that the area under fodder crops is intensively cultivated so that the factors of production can be utilized to their fullest extent.

Handbook on grain and feeding stuff drying, D. MEYER (Handbuch der Futtermittel und Getreidetrocknung. Leipzig, 1912, pp. XII+294, pls. 5, figs. 11).—This describes the process, machinery, and other equipment required for drying grain, grass, clover, serradella, lupines, acorns, horse chestnuts, brewers' grains, yeast, distillery slop, and refuse from products of starch factories. The composition, digestibility, and other matters relating to the value of these materials as feeding stuffs are discussed.

Silage from turnip leaves, O. T. BJANES (Norsk Landmandsblad, 31 (1912), No. 34, pp. 451, 452, figs. 2).—Turnip-leaf silage, according to the author's experience, makes an excellent dairy feed when fed about 20 to 25 lbs. daily in connection with dry roughage and grain feeds. In order to obtain a good quality of silage it is important to ensile the leaves as soon as possible after he cutting, while they are still green and succulent. A small stack silo is described for making silage.

Feeding stuff inspection (Maine Sta. Off. Insp. 38, pp. 25-72).—Analyses are reported of cotton-seed meal, cotton-seed feed, gluten feed, linseed meal,

distillers' grains, red dog flour, wheat middlings, wheat bran, beef scrap, and mixed feeds. There is also a list of registered feeding stuffs and their guaranteed analysis.

Commercial feeding stuffs of Pennsylvania in 1911, J. W. KELLOGG ET AL. (*Penn. Dept. Agr. Bul.* 223, 1912, pp. 171).—Analyses are reported of cotton-seed meal; linseed meal; corn oil meal; distillers' grains; brewers' grains; malt sprouts; gluten feed; hominy feed; corn bran; corn flour; wheat, rye, and buckwheat middlings; wheat, rye, and animal by-products; wheat bran; wheat and rye offals; buckwheat feed; alfalfa meal; beet pulp; calf meals; and mixed, proprietary, condimental, and miscellaneous feeds.

Feeding stuffs, R. H. CARTER and S. J. M. AULD (*Jour. Southeast. Agr. Col. Wye*, 1911, No. 20, pp. 261-263).—Analyses are reported of a mixed cake, linseed cake, undecorticated cotton cake, rape nibs, Niger seed cake, meal, cod liver oil condiment, and molasses food.

Condimental stock foods (*Amer. Food Jour.*, 7 (1912), No. 8, pp. 16, 17).—An editorial which contains a discussion of the significance of the recent decision of the U. S. Supreme Court whereby States are authorized to enact and enforce laws relating to condimental stock feeds, and to charge a fee for their inspection.

Analyses of some fats of the American buffalo (bison), A. H. SCHMIDT (*Jour. Indust. and Engin. Chem.*, 4 (1912), No. 8, p. 592).—Analyses are reported of the fat of steers and of American bison, taken from different parts of the body.

The chief difference was in the kidney fats, the chemical constants of which are as follows: Buffalo, specific gravity 0.9346, free fatty acids 1.65 per cent, titer 52.2° C.; iodine number 29.45, saponification number 199.3; steer, specific gravity 0.933, free fatty acids 0.6 per cent, titer 42.85° C., iodine number 48.8, and saponification number 196. The differences are thought by the author to be due to the difference in size of the kidneys, which in the bison are about one-half the size of the cattle kidneys.

On the normal presence of manganese in animals, G. BERTRAND and F. MEDIGRECANU (*Compt. Rend. Acad. Sci. [Paris]*, 154 (1912), Nos. 15, pp. 941-943; 22, pp. 1450-1452; *Orig. Commun. 8. Internat. Cong. Appl. Chem. [Washington and New York]*, 15 (1912), Sect. VII, p. 35).—Traces of manganese were found in about 60 species of wild and domesticated animals, and it is therefore thought that its presence has some physiological significance and is not merely accidental, as is commonly supposed.

The enzymes of the ovaries, W. LÖB and S. GUTMANN (*Biochem. Ztschr.*, 41 (1912), No. 6, pp. 445-460; *abs. in Jour. Chem. Soc. [London]*, 102 (1912), No. 598, II, p. 783).—Catalase, diastase, lecithase, lipase, urease, nuclease, and proteolytic ferments of the trypsin and pepsin type were found in the ovaries of pigs. Peroxidase, invertase, lactase, glycolytic enzymes, desamidase, and tyrosinase were not detected.

The behavior of fat-soluble dyes and stained fat in the animal organism, L. B. MENDEL and AMY L. DANIELS (*Jour. Biol. Chem.*, 18 (1912), No. 1, pp. 71-95).—The work of other investigators on this topic is reviewed and experiments in feeding dyes to rats, cats, guinea pigs, pigeons, hens, frogs, cow, and a goat are reported. The dyes used were Sudan III, Biebrich scarlet, indophenol, oil-soluble green, oil orange, blue base, Dandelion Brand blue color, and annatto.

The results, which in general are comparable to those previously noted from other sources, are summarized as follows: "Some of the fat-soluble dyes introduced into the organism by various paths, are deposited in the skin."

bones and bone marrow. The renal and nervous tissues are free from the dye, even when the fatty tissues are deeply colored. Muscle probably does not take up the dye. It is seldom found in the liver, because the fat-soluble dyes, which are insoluble in water, dissolve readily in the bile and are excreted thereby into the intestine from which they can be reabsorbed.

"The fat-soluble dyes may enter the organism from the alimentary tract through the lymphatics, in solution in fat; or by the portal circulation, dissolved in reabsorbed bile. They do not pass beyond the liver unless fat is present to transport them. Then they may be found in the blood, which is rarely free from the dye in a normally fed animal that has once been stained. A cycle between intestine, bile, and blood becomes established. No elimination of the dyes occurs through the kidneys, except when an alimentary lipuria arises (in rabbits and rats).

"Contrary to the assertion of others, the stained fat is no less available to the organism than the unstained. In cases conducive to fat transport—in starvation, phosphorus and phlorhizin poisoning—stained fat migrates from the stained depots to the blood and the liver cells. Here the dye is separated and secreted into the bile, so that the liver, though having a high content of it, may be free from the dye. Stained fat does not traverse the placenta. The blood of the fetus and the fat of young born of Sudan-stained mothers are free from dye.

"The excretion of Sudan III and Bleibich scarlet in milk, when they are given with food fat, suggests that the latter may pass directly into the mammary secretion. With cats and rats the results are striking, but the dye excretion in milk ceases when the stained food is no longer fed. In guinea pigs and goats the secretion of dye in the milk is positive; in the cow it has not yet been demonstrated. The variation in the outcome in the different species may be due to variations in the relative abundance in the dietaries of fat necessary for the absorption and transport of the dye. This explanation is emphasized by the observation that those animals (cats, rats, hens, pigeons) for which fat enters more largely into the diet, become stained more easily or speedily than animals which are accustomed to ingest relatively smaller amounts of fat."

The misuse of the term "melanin," R. A. GOETTER (*Science*, n. ser., 36 (1912), No. 315, pp. 52, 53).—The author suggests that we substitute for melanin and melanin nitrogen of protein hydrolysis the terms proposed by Osborne, humin or humin nitrogen, and reserve the term melanin for those dark pigments which occur normally or pathologically in the animal body, skin, hair, or feathers.

The case of generalized melanosis in fowls, LEWIN (*Ztschr. Veterinärk.*, 28 (1910), No. 10, pp. 455, 456; *abs. in Berlin. Tierärztl. Wchnschr.*, 28 (1912), No. 51, p. 567).—A brief description of a cock in which melanotic pigment was present in the muscles, bones, and other internal tissue as well as in epidermal structures.

The present status of the genetics problem, W. J. SPILLMAN (*Science*, n. ser., 36 (1912), No. 307, pp. 757-767).—The author briefly discusses some of the results which have been accomplished by the different methods of genetic heredity. Some suggestions for future work are offered.

Results of in-and-in breeding among wild animals, W. T. HORN (*Internat. Zool. Cong.*, 7 (1907), pp. 162-164).—The author believes that the ill effects supposed to be due to in-and-in breeding when practiced on domesticated animals do not occur in the case of wild animals, provided they are given free range, proper protection, and abundant food. These

views are based on the results accomplished in 45 years' breeding of red deer in New Zealand and 15 years' breeding of fallow deer on the Island of Lambay.

Live-stock breeding in Hungary, J. ROSTAFINSKI (*Die Tierzucht Ungarns. Vienna and Leipzig, 1912, pp. IX+178, pls. 40, figs. 56; abs. in Österr. Moth. Ztg., 19 (1912), No. 16, p. 249*).—A treatise which discusses the conditions of the live-stock industry in Hungary and describes methods of breeding, feeding, and managing horses, cattle, sheep, and swine.

Statistical data on our European meat trade, J. EL. RICHELET (*Bol. Min. Agr. [Buenos Aires], 14 (1912), No. 2, pp. 167-197*).—This contains data on the production and export of meat from Argentina.

The origin and use of the herd book, with special reference to cow-testing associations and judging live stock, W. LÜKEN (*Kühn Arch., 1 (1911), pt. 2, pp. 253-319*).—This article discusses the substantial features of herd books as a means for improving live stock. Detailed measurements are also given of zebus, yaks, gayals, and bantengs, and of crosses of zebus and gayals with common breeds of cattle.

Native and grade cattle breeding, J. M. SCOTT (*Florida Sta. Bul. 110, pp. 59-72, figs. 9*).—Native cows were bred to Hereford, Shorthorn, and native bulls and kept on the same range until the calves were weaned. After weaning time the calves were all kept on the same pasture in summer, but in the winter were given the range of a velvet-bean and Japanese-cane field. The average birth weights were as follows: Five grade Herefords, 47.9 lbs.; 4 grade Shorthorns, 56 lbs.; and 3 natives, 48.6 lbs. At weaning time, when the calves were 7 months old, the weights were for the grade Herefords 351.6 lbs., grade Shorthorns 342.5 lbs., and natives 305 lbs. The average weights of 2 animals in each lot at 1 year of age were, grade Herefords 405 lbs. and grade Shorthorns and natives 447.5 lbs.

When weighing about 700 lbs. these 6 animals were put in a small yard and fed for 90 days a ration of shelled corn, cotton-seed meal, and Japanese cane. The average daily gains per head and day were 1.25 lbs. for the grade Herefords, 1.89 lbs. for the grade Shorthorns, and 1.78 lbs. for the natives.

The author discusses beef production in Florida and advocates better winter feeding of native cattle and the selling of calves at weaning time.

The organization of cattle breeding in Kamerun (*Deut. Kolon. Bl., 33 (1912), No. 6, pp. 253-260; abs. in Internat. Inst. Agr. [Rome], Bul. Bär. Agr. Intel. and Plant Diseases, 3 (1912), No. 6, pp. 1366, 1367*).—An account of breeding operations by the German government in introducing zebus and the Allgau breed to cross with the native cattle of Kamerun.

Investigations on the rutting of cattle, E. WEBER (*Untersuchungen über die Brunst des Rindes. Abhandl. K. Sächs. Tierärztl. Hochsch. Dresden, 1911, pp. 67*).—Previously noted from another source (*E. S. R., 26, p. 367*).

Cattle feeding, W. HAWK (*Cornwall County Council Agr. Expts. 1911, pp. 1-46*).—In a feeding test with 15 steers the addition of 28 lbs. of mangels to a daily ration of 2 lbs. decorticated cotton-seed cake, 2 lbs. corn meal, and second-rate hay increased the daily gains per head from 1.25 lbs. to 1.83 lbs., and the addition of 56 lbs. of mangels increased the daily gains to 1.96 lbs. Two steers fed mangels and good hay ad libitum, with 6 lbs. corn meal, gained 1.61 lbs. each daily for 2 months against 1.45 lbs. for 4 steers on good pasture and hay ad libitum with 6 lbs. corn meal. Analyses are given of a large number of samples of mangels.

Four heifers fed daily 2 lbs. soy-bean cake, 2 lbs. undecorticated cotton-seed cake, and 2 lbs. corn meal each gained 2.64 lbs. per head and day for 18 weeks against corresponding gains of 2.46 lbs. for 3 heifers fed 3 lbs. linseed meal and 3 lbs. decorticated cotton-seed cake. Three heifers fed 3 lbs. soy-bean cake and

3 lbs. undecorticated cotton-seed cake gained 2.5 lbs. per head and day for 18 weeks against a corresponding gain of 2.54 lbs. for 3 heifers fed 6 lbs. linseed meal. It is stated as a result of feeding experiments with young cattle that if they could be kept in a thriving instead of a stationary condition all winter the percentage of deaths during the spring would be enormously diminished.

[Dried beet pulp for fattening cattle], J. MACKINTOSH (*Jour. Southeast. Agr. Col. Wye, 1911, No. 20, pp. 31-38*).—In tests with steers 1 lb. of beet slices was found to be equivalent to about 8 lbs. of mangels, but it is stated that it is inadvisable to feed more than 7 lbs. of the pulp per head per day.

Fattening calves in Alabama, D. T. GRAY and W. F. WARD (*U. S. Dept. Agr., Bur. Anim. Indus. Bul. 147, pp. 40, pls. 3*).—The data reported in this bulletin have been previously abstracted from another source (*E. S. R., 27, p. 372*).

Sheep feeding and farm management, D. H. DOANE (*Boston, New York, and London, 1912, pp. XII+128, pls. 2, figs. 38*).—A practical work on modern and profitable methods for buying, feeding, and marketing sheep, based on a study of actual farm practices on farms in different sections of the United States.

Horse breeding in Tunis, P. DIFFLOTH (*Vie Agr. et Rurale, 2 (1912), No. 8, pp. 198-197; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 3 (1912), No. 4, pp. 967, 968*).—This discusses the measures by which horses have been improved in Tunis since the French occupation in 1881.

Investigations into the growth of the hoof of horses, C. SCHULZE (*Monatsh. Prakt. Tierheilk., 22 (1912), No. 1-2, pp. 64-85; abs. in Deut. Landw. Presse, 89 (1912), No. 7, pp. 67, 68; Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 3 (1912), No. 3, pp. 734, 735*).—The following results were obtained as a result of measuring the growth on 800 hoofs:

"The growth of the wall of the hoof averages 7.66 mm. per month. Unshod hoofs grow 8.6 mm. on the average per month, and shod hoofs only 6.73 mm. . . .

"The fore and hind hoofs grow at about the same rate, but the rate of growth of the different hoofs is seldom quite uniform. The hoof growth around the coronet is uniform in 90.6 per cent of all hoofs and irregular in 9.4 per cent. Irregular growth rarely occurs with regular shapes of hoof.

"When unshod hoofs are shod, there is an arrest of growth. Good care of the hoofs and good shoeing, especially that method of shoeing by which the hoof approximates more to natural conditions (seated shoes and half shoes), may reduce this injurious effect.

"The hoofs of horses aged from 5 to 10 years have on the average a monthly growth of 0.29 mm. faster than the hoofs of horses aged from 11 to 19.

"The color of the hoof has no relationship to its rate of growth. The duration or kind of work does not affect the rapidity of hoof growth to any ascertainable extent.

"In foundered hoofs the heel grows more rapidly than the toe and quarters. In hoofs shod with bar shoes the toes grow from 2 to 5 mm. more per month than the remaining wall sections. Injuries to the hoof coronet give rise to an additional growth up to 7 mm. per month in the corresponding part of the wall.

"Single dressings with cantharis ointment or cauterization of points on the coronet usually result in an increased growth of 3 mm. in the wall in the month following. A better result is obtained by frequently repeated dressings with ointment, but there is no specific capable of permanently increasing the horn production.

"Hoofs in which the volar or plantar nerves are severed grow on the average 2.5 mm. per month more than sound hoofs.

"General diseases as a rule lead to no arrest of hoof growth; indeed there is often an enhanced growth after recovery from a disease. The hoof horn, however, becomes dull when the animal is ill and shows a deficiency in moisture and elasticity."

Contribution to the study of the dentition of the Equidae, A. VERTÉ (*Arch. Naturgesch.*, 78 (1912), Abt. A, No. 5, pp. 1-33, pls. 2).—A discussion of the character and succession of teeth in horses, zebras, and extinct equine types.

Ostriches [and stallions] from the Sudan (*Agr. Jour. Union So. Africa*, 3 (1912), No. 6, pp. 807-813).—A brief report of an expedition sent by the Union Government of South Africa to secure, if possible, some ostriches from the northern sections of the continent, where there is believed to be a special type from which the best feather producers of the South African birds have descended.

The feathers which could be obtained from birds east of Lake Chad were very thin, much like the feathers of the wild birds of South Africa. In northern Nigeria 140 birds were obtained and taken to Cape Town. The peculiarities of these birds were dense, healthy, short feathers, red skins, bald heads, and eggs larger than the South African ostriches, but unpocketed and a thin shell.

There is a note concerning 2 Asben stallions obtained from the Tuarek tribe, a breed which is considered by these people to be superior to the Arabian horses and which has been kept pure for many centuries.

Poultry keeping as an industry for farmers and cottagers, E. BROWN (*London*, 1912, 8. ed., pp. VI+206, pl. 1, figs. 110).—Some of the chapters in this book have been rewritten since the last edition, and much new matter has been incorporated embodying the more recent results of practical experience in poultry keeping.

Fleshing chickens for market, W. A. WILSON (*Saskatchewan Dept. Agr. Bul.* 25, 1911, pp. 29, figs. 15; abs. in *Internat. Inst. Agr. [Rome]*, *Bul. Bur. Agr. Intel. and Plant Diseases*, 3 (1912), No. 3, pp. 742, 743).—The average cost of fattening poultry in experiments carried out in the years 1907 to 1910 was 5.98 cts. per pound dressed weight, and the selling price 18.74 cts. per pound dressed weight. The average dressed weight per bird was 3.23 lbs. The methods of feeding are given.

A new process of preserving eggs (*Sci. Amer. Sup.*, 74 (1912), No. 1929, p. 76, figs. 4).—This describes the process invented by M. Lescardé in which the eggs are placed in a specially constructed metal box and carbon-dioxide and nitrogen gas used as sterilizing agents.

"When the box is filled with eggs, a small amount of chlorid of calcium is put in to absorb the greater part of the moisture of the air, and then the cover is soldered on, leaving a small hole in the top for the circulation of air or gas. The boxes are then ready to be taken to the sterilizer, which consists of a large cylindrical tank. . . . The boxes are stacked upon roller trucks, which are then run upon rails to the tank, a considerable number being treated at a time. The cylinder has a tight closing door, and resembles an injecting cylinder for treating railroad ties. The tank is first of all exhausted to extract the gases or air from the air pocket of the eggs and also the gases dissolved in the albumin. After this has been done, carbonic-acid gas is sent into the apparatus from steel bottles containing compressed or liquefied gas. As the gas which leaves the bottles becomes very cold owing to its expansion it is warmed somewhat to prevent cracking of the eggshells. For this purpose the gas is run through a worm tube placed in a tank of warm water. The pressure in the tank is observed by means of a gauge. After admitting a certain amount, the gas is shut off for a time, while it continues to be absorbed by the albumin of the eggs. Fresh gas is then let in when the pressure is seen to fall, and

this is kept up until the eggs absorb no more gas. When the proper point in this operation is reached the carbonic-acid gas is shut off, and a portion of it is then again extracted by pumping, to be replaced by a certain amount of nitrogen fed from compressed gas cylinders. The eggs are then ready to be removed from the tank, and the trucks are rolled out, after which the workmen solder up the small inlet opening. As the pressure in the box is above atmospheric, there is no danger of air leaking in."

The Canada grouse (*Dendragapus canadensis*) in captivity; its food, habits, etc., W. L. BISHOP (*Proc. and Trans. Nova Scotian Inst. Sci.*, 13 (1911-12), No. 2, pp. 150-153).—This account is based on several years' experience in keeping Canada grouse or "spruce partridge" in an inclosure.

International Association of Instructors and Investigators in Poultry Husbandry (*Proc. Internat. Assoc. Instr. and Invest. Poultry Husbandry*, 1 (1908-1910), pp. 164, pls. 4, figs. 5).—This contains the proceedings of the association for 1908, 1909, and 1910. The following are among the more important papers which have not been previously noted from other sources: The Field of Research in Poultry Husbandry, by H. Atwood; The Present Status of Investigation of the Problems of Poultry Culture, by P. B. Hadley; Profitable Lines of Investigation in Poultry Diseases, by G. B. Morse; Present Condition of Experimental Work in Feeding, by R. R. Slocum; Comparison of Poultry Keeping in Europe, United States, and Canada, by W. Brown; An Outline for a Course of Study in Poultry Husbandry, by J. E. Rice; Study of Feeds and Methods of Instruction in Feeding, by W. G. Krum; Instruction in Feeding Poultry, by C. A. Rogers; Poultry Pathology, Its Place in the Curriculum, by G. B. Morse; Teaching by Farm Trains and Educational Exhibits at Fairs, by W. A. Brown; and Teaching by Lectures, Recitations, and Reference Reading, by W. A. Lippincott. Appended is a bibliography of about 1,000 titles.

DAIRY FARMING—DAIRYING.

The relation between form and function in dairy cattle and the outer milk signs of cows, W. GAUDE (*Arb. Deut. Gesell. Züchtungsk.*, 1911, No. 7, pp. I+799, tables 18).—The author reports measurements and other data concerning 715 dairy cows in tabular form. The conclusion is drawn that external measurements do not furnish a guide to the milk-producing capacity of the dairy cow, but, as Rodewald has shown for the data reported by Schmidt and Kronacher (*E. S. R.*, 21, p. 778), this finding may be due to the method of tabulation employed by the author.

Conformation and milk production (*Österr. Milk. Ztg.*, 19 (1912), No. 1, pp. 1, 2).—A discussion of the views of Gaudé, noted above, and others who have written on the subject of correlation between form and function of dairy cows.

[The relation between conformation and milk production], J. H. W. T. REMERS (*Kultura*, 24 (1912), Nos. 281, pp. 21-34; 282, pp. 7-91; 283, pp. 113-121; 284, pp. 144-157; 285, pp. 184-194).—Measurements of dairy cows are given, and the correlation between form and function is discussed.

Progress made in the improvement of the Norrland mountain breed of cattle during the last two decades, E. O. ARENANDER (*K. Landtbr. Akad. Handl. och Tidskr.*, 51 (1912), No. 5, pp. 336-361, figs. 11).—This is a discussion of the various agencies that have been brought to bear on the recent improvement of this Swedish breed, and the yields of 3 herds during 1904-1908 are given as an illustration of the progress made. One of these increased in production from 2,409.6 to 2,597.4 kg. of milk per head, and from 93.19 to 118.07 kg. butter fat, the average Swedish feed units (each equal to 2 Danish

feed units) eaten in 1904 being 1,244, and in 1908 1,367. A similar increased production was obtained in other herds. The maximum yield of a cow for the year in these herds was 4,195 kg. milk, containing 165.53 kg. fat; the feed units eaten, 1,800. The increase in production has come through systematic breeding, by the use of pure-bred bulls of proved dairy capacity, and through improved methods of feeding and caring for the cattle. In the author's opinion the old Swedish mountain breed is splendidly adapted to, and in some ways is unexcelled for, Norrland, and should be retained and further improved.

Experiments in milking cows two and three times a day, N. O. HOFMAN-BANG ET AL. (*Ber. K. Vet. og Landbohøjskoles Lab. Landøkonom. Forsøg [Copenhagen]*, 78 (1912), pp. 50).—In milking trials on 4 different estates, involving 172 cows that averaged from 13 to 14 kg. of milk per day, milking 3 times a day produced an average increase of 0.8 kg. per head and day. The fat content was not appreciably affected, but where the cows were not fed heavily there was a slight loss in body weight. These trials did not furnish any evidence as to the possible influence that frequent milking of heifers might have on the development of the milking capacity of the mature cow.

Free's cottagers' cow club (*Jour. Bd. Agr. [London]*, 19 (1912), No. 5, pp. 388-392).—A society composed of owners of small farms in Shropshire, England, who have since 1838 run a successful system of live-stock insurance, under which the members in return for a payment of 4s. 2d. per cow per annum receive the value up to £12 for every insured cow that dies of disease or accident. A reserve fund of £1,040 has accumulated, which secures them against having to meet heavy losses.

The dairy industry in western Siberia and the possibilities of its extension, HOLLMANN (*Mitt. Deut. Landw. Gesell.*, 27 (1912), Nos. 12, pp. 182-186; 13, pp. 197, 198; 14, pp. 211-214; abs. in *Internat. Inst. Agr. [Rome]*, Bul. Bur. Agr. Intel. and Plant Diseases, 3 (1912), No. 6, pp. 1428-1431).—A general statistical account of the development of the dairy industry in Siberia since the first dairy was established at Kurgan in 1894.

Journal of the British Dairy Farmers' Association, 1912 (*Jour. Brit. Dairy Farmers' Assoc.*, 26 (1912), pp. 288, figs. 16).—This contains reports of the International Dairy Congress at Stockholm, 1911, the dairy show of the British Farmers' Association, 1911, milk trials and butter tests, and other matters relating to the dairy industry in Great Britain. Among the papers on special topics are the following: The Dairy Industry in the Netherlands, by J. J. L. Van Rijn; Milk Records, by J. Mesdag; Fighting Contagious Diseases of Animals in the Netherlands, by J. Poels; Cooperative Bacon Curing, by L. M. Douglas; The Letting of Dairies, a West Country Custom, by J. H. Burton; The Dairy Conference in Holland, by F. J. Lloyd; and Rearing and Preparing Poultry for Market, by S. C. Sharpe.

Report of the dairy and cold-storage commissioner, J. A. RUDNICK ET AL. (*Rpt. Dairy and Cold Storage Comr. Canada, 1912*, pp. 150, pls. 6).—This contains records of dairy herds, data on the cost of milk production, trade in milk and milk products, the temperature of creamery butter at shipping stations, cow testing associations, and brief reports on care and handling of cream for butter making.

Report on the activities of the dairy institute at Proskau, KLEIN (*Ber. Indus. Inst. Proskau, 1911-12*, pp. 17).—This reports analyses of milk, trials of dairy apparatus, and other work on related topics.

Cost of milk production in Hungary, E. KOEFLER (*Indus. Latt. [Paris]*, 1912, No. 35, pp. 594-598).—Figures are given showing the mean annual cost of milk production in Hungary from cows producing an average of 6 litres of milk daily to be 14.57 fillers per liter (about 3 cts. per quart).

The milk supply of Genoa, E. BERTARELLI (*Chacaras e Quintaes*, 5 (1912), No. 2, pp. 4-9; *abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases*, 3 (1912), No. 4, pp. 1914, 1915).—Since the formation of an association of the milk producers that send milk to Genoa the quality of the milk has improved and the consumption greatly increased. The retail price is about 31 cts. per gallon, and the expense per gallon as follows: Cost of milk 18.4 cts., freight to Genoa 1.7 cts., cartage from railway to town 0.9 ct., town duty 3.5 cts., handling and storing at Genoa 1.7 cts., sale and general expense 3.5 cts., and return of empties 0.9 ct.

Studies of pure milk, C. GRANVIGNE and G. CASSEZ (*Separate from Compt. Rend. Assoc. Franç. Adv. Sci.*, 1911, pp. 14).—Analyses are reported of mixed milks and butter made from samples thereof.

The factors affecting the fat content of milk, A. MAILLÈVRE (*Bul. Soc. Sci. Hyg. Aliment.*, 1 (1911), No. 1-2, pp. 52-62).—A general discussion of the influence of breed, feed, and other factors which affect the percentage of fat in milk.

Changes in the composition of the milk of the cow on different diets, K. HELLE ET AL. (*Ztschr. Biol.*, 58 (1912), No. 8-11, pp. 355-374; *abs. in Jour. Chem. Soc. [London]*, 102 (1912), No. 598, II, p. 736).—The effect of various diets on the composition of milk was slight. The protein, sugar, and ash remained very constant. The amount of fat, solids-not-fat, and the fuel value varied more or less from day to day. Data are also reported on the specific gravity of the milk, the specific gravity of the serum, freezing point, osmotic pressure, refraction of the serum, and electrical conductivity.

The iron content of goat's milk, M. STAFFORD (*Ztschr. Kinderheilk., Orig.*, 4 (1912), No. 2, pp. 168-170; *abs. in Zentbl. Expt. Med.*, 2 (1912), No. 4, p. 149).—The author found from 1.27 to 2.63 mg. of iron in 1 liter of goat's milk.

Arsenic in milk, I. McCRAE (*Agr. Jour. Union So. Africa*, 3 (1912), No. 6, pp. 842, 843).—Samples of milk were taken from cows which had been habituated to a weekly arsenical dip for many years.

By the Reinsch process, which is capable of detecting 0.0001 grain of arsenic, no indication of the presence of this element could be obtained when working on 100 cc. Arsenic was present in some samples, as indicated by the Marsh process, but there could not have been enough in any case to have any toxic effect. Other samples were entirely free from arsenic. This indicates that the arsenic is not absorbed by the animal and secreted in the milk, and wherever traces of arsenic have been present it has probably been due to accidental contamination during the process of milking.

It was found that distilled water free from arsenic, after standing in a new washed glass bottle for 14 days, absorbed from the glass enough arsenic to be revealed by the Marsh test. Therefore, the danger to the consumer from milk may be less when cows are dipped in arsenical solutions than when milk is kept in glass bottles, but both dangers are considered negligible.

Preservation of milk samples for analysis [with potassium bichromate], X. ROCQUES (*Ann. Palsif.*, 5 (1912), No. 45, pp. 338-342; *abs. in Jour. Soc. Chem. Indus.*, 31 (1912), No. 15, p. 742).—Studies of milk samples preserved with potassium bichromate in accordance with the French law (1 gm. per liter of milk) showed the necessity of adding the bichromate to the milk as soon as possible, because of the marked reducing action of lactic acid. If changes have already taken place before the bichromate is added, analysis should be performed as soon as possible. After keeping for some time lactic acid entirely reduces the bichromate present and so destroys the antiseptic action.

Shall we abandon fresh milk? R. E. WOOD (*Amer. Food Jour.*, 7 (1912), No. 8, pp. 1-4, figs. 3).—This discusses the value of pasteurizing and inspection of milk as safeguards against milk-borne epidemics of disease. "Sterilized and evaporated milk delivered to the consumer in hermetically sealed packages is advocated as the only milk for those who seek an absolutely hygienic product.

Market milk regulation (*N. Y. Produce Rev. and Amer. Cream.*, 34 (1912), No. 7, pp. 330-333).—This gives a classification of milk and cream, definitions of bacteriological and chemical standards, and rules for producing, handling, and distributing milk, suggested by the New York Milk Committee.

That milk control, J. H. MONRAD (*N. Y. Produce Rev. and Amer. Cream.*, 34 (1912), No. 12, p. 556).—A criticism of the recommendations of the New York Milk Committee, noted above.

Milk control regulations, C. E. NORTH (*N. Y. Produce Rev. and Amer. Cream.*, 34 (1912), No. 19, pp. 816, 817).—A discussion of the report of the milk commission, noted above.

A lawyer's views on milk standards and regulations, W. J. CARLIN (*Cream. and Milk Plant Mo.*, 1 (1912), No. 1, pp. 9-11).—The author suggests efficient state inspection of dairies as a solution of the difficulties connected with milk inspection, and states that reasonableness is the test by which standards and regulations must eventually stand or fall.

Milk and cream regulations (*Brit. Food Jour.*, 14 (1912), No. 164, pp. 146-149).—These regulations of the Local Government Board of England and Wales, issued in 1912, prohibit the use of preservatives in market milk or the addition of any thickening substance to cream. Boric acid, borax, or hydrogen peroxid may be added to cream containing more than 35 per cent fat under certain restrictions.

The score-card system of dairy inspection, G. M. WHITAKER (*U. S. Dept. Agr., Bur. Anim. Indus. Circ.* 199, pp. 32).—A revision of Circular 139, previously noted (*E. S. R.*, 20, p. 1073).

A simple butter color standard, S. H. AYERS (*U. S. Dept. Agr., Bur. Anim. Indus. Circ.* 200, pp. 3, fig. 1).—This circular advocates as a standard for comparing color for butter fat the use of a graduated series of solutions of bichromate of potash of varying strength, so arranged as to give a range of color from a light to a dark yellow. Each shade is given a numerical value. The method of using the standard is given in detail.

In regard to the consistency of the cheese mass during the manufacture of Edam cheese, W. VAN DAM (*Centbl. Bakt. [etc.]*, 2, Abt., 32 (1911), No. 1-2, pp. 7-40, figs. 3; *Verslag. Landbouwk. Onderzoek. Rijkslandbouwproefstat. [Netherlands]*, 1911, No. 10, pp. 5-49, figs. 3; *Rev. Gén. Lait.*, 9 (1912), Nos. 3, pp. 56-63; 4, pp. 73-80, figs. 3; 5, pp. 103-110; 6, pp. 131-139; 7, pp. 151-158).—Continuing previous work (*E. S. R.*, 23, p. 212), the author now points out that the digestion of casein is not the only factor upon which the typical structure of Edam and other cheeses depends. This work was conducted for the purpose of studying the following points: (1) The fixation of lactic acid by casein; (2) the relation which the structure of the cheese has to the acidity and the sodium chlorid concentration; and (3) the neutralizing capacity of the bodies which are precipitated from milk by rennet.

By physico-chemical methods it was determined that lactic acid was capable of fixing a certain amount of casein (4.25 per cent of its weight). The casein lactate thus formed was very easily hydrolyzed by water. The fixing of this amount of lactic acid, according to the author, gives a full explanation for the small amounts of lactic acid found in Edam cheeses in the work previously reported. No reason, therefore, exists for differentiating between calcium

monolactate and bilactate, and the results obtained point to the view that a calcium phosphocaseinate exists in milk in solution. It was further noted that the greater or lesser swelling of the cheese mass, upon mixing with lactic acid and 5 per cent of sodium chlorid, is a function of the hydrogen ion concentration. This fault in cheese making may, therefore, be said to be due to insufficient swelling of the calcium lactocaseinate under the influence of the sodium chlorid and hydrogen ions.

Tests were also conducted to determine the influence of the concentration of the sodium chlorid of the cheese moisture upon the swelling of the cheese mass. The maximal swelling was found to set in at the concentration of ± 5 per cent, which is found in practice to be the normal. At a lower or higher concentration the rate of swelling decreases. The curves obtained in this work also explain the formation of the so-called salty crust of Edam cheese. In a concentration of from 10 to 15 per cent of sodium chlorid in the cheese moisture no swelling of the casein takes place. This phenomenon is a colloidal-chemical and not a bacteriological one. The formation of heavy crusts in cheeses can also be explained in the light of colloid chemistry (Gels). In caseifying certain milks it was noted that the acidity of the cheese mass as noted had no relation to the neutralizing properties of the substances precipitated by rennet. The production of short cheeses from calcium-poor milks has no relation to the lesser neutralizing property of such milks, but they are a factor in so far that they have a tendency to retain too much whey, and this results in the production of a sour cheese. Milk sugar is also a factor in this case.

Some tests are also included which deal with the factors which influence the moisture content of the cheese mass. These will be reported upon at a later date. The results of some experiments are given which tend to set aside the conception that the peptonization of casein is not due to bacterial action.

On the consistency of the cheese mass, F. W. J. BOEKHOUT and J. J. OTT DE VRIES (*Centr. Bakt. [etc.]*, 2. Abt., 33 (1912), No. 25, pp. 609-617, fig. 1).—A critical discussion of the article noted above.

Brinsen cheese, WINKLER (*Österr. Milk. Ztg.*, 19 (1912), No. 16, pp. 241-243, figs. 5).—The different methods of making Brinsen cheese are described.

White Gorgonzola cheese, trans. by J. H. MONKAD (*N. Y. Produce Rep. and Amer. Cream.*, 34 (1912), No. 18, p. 793).—The contrasts between the methods of making white and green Gorgonzola cheese are pointed out.

VETERINARY MEDICINE.

Special pathology and therapeutics of the diseases of domestic animals, F. HUTYRA and J. MAREK, edited by J. R. MOHLE and A. EICHORN (*Chicago*, 1912, vol. 1, pp. XVI+1133, pls. 10, figs. 198).—An authorized American edition translated from the third revised and enlarged German edition (E. S. R., 23, p. 82).

A manual of veterinary physiology, F. SMITH (*London*, 1912, 4. ed., pp. XII+808, pl. 1, figs. 280).—A fourth revised and enlarged edition of this work.

Compendium of practical toxicology, R. KOBERT (*Kompendium der Praktischen Toxikologie*, Stuttgart, 1912, 5. ed., rev. and enl., pp. XII+328).—This is the fifth edition of this well-known work which has been entirely rewritten and enlarged. It is meant for physicians, health officers, and students.

In regard to the theory of disinfection, R. BETZEL (*Zur Theorie der Desinfektion*, Diss. Tech. Hochschule Karlsruhe, 1911, pp. 64).—The adsorption of chloroform, silver nitrate, corrosive sublimate, formaldehyde, and phenol at various concentrations by yeast was studied. It was noted that the process of taking up the disinfectant was an adsorption phenomenon. The disinfecting

property of phenol is no simple function of the amount of disinfecting agent taken up by the yeast.

Antitoxin and protein. P. H. RÖMER (*Ztschr. Immunitätsf. u. Expt. Ther.*, *I, Orig.*, 19 (1912), No. 3, pp. 260-282).—The milk from sheep which were previously injected with tetanus antitoxic serum from the horse contained antitoxin. Horse serum protein could not be detected with certainty with the aid of the complement fixation and precipitation methods. The serum of sheep which were treated by various methods with tetanus antitoxin obtained from the horse showed the presence of this antitoxin for a period of six months thereafter, while the substances which can be precipitated by antiserum vanished long before this period.

About neosalvarsan. E. SCHREIBER (*München. Med. Wchnschr.*, 59 (1912), No. 17, pp. 905-907; *abs. in Centbl. Bakt. [etc.]*, 1. Abt., *Ref.*, 54 (1912), No. 3, pp. 82, 83).—Neosalvarsan is a monobody which results from the condensation of sodium formaldehyde-sulphoxylate with salvarsan. It is easily and neutrally soluble in water. According to Ehrlich it is more toxic to the trypanosomes than salvarsan, about 1 gm. being as toxic as 1.5 gm. of salvarsan. The main thesis of this work was in regard to spirochete infections (lues) in man.

The action of salvarsan on anthrax, SCHUSTER (*Abd. in Ann. Méd. Vét.*, 61 (1912), No. 6, p. 342).—Experiments show that salvarsan exerts a specific action on the anthrax bacillus. When an injection of salvarsan was made simultaneously with the inoculation of a virulent culture of the anthrax bacillus no signs of the disease appeared. Recovery resulted when the injection of salvarsan was made from 1 to 12 hours after the rabbit was experimentally infected.

Contribution to our knowledge of the precipitin reaction as an aid for diagnosing anthrax, PROFF (*Centbl. Bakt. [etc.]*, 1. Abt., *Orig.*, 64 (1912), *Festschrift F. Loeffler*, pp. 185-189).—The author sought to determine in what way the method and time of heating the anthrax material influenced the results obtained with the precipitin reaction. Repeated boiling of the material from animals suffering from anthrax in an aqueous or saline solution over the direct flame has no more effect upon the precipitinogen than keeping it in boiling water from 5 to 45 minutes.

The chloroform precipitation method (E. S. R., 27, p. 80) has the advantage over the heating method in that it yields clearer extracts and gives a sharper reaction. A modification of the chloroform method is given.

Report of the departmental committee appointed by the president of the Board of Agriculture and Fisheries to inquire into foot-and-mouth disease (*Rpt. Dept. Com. Bd. Agric. and Fisheries [Gt. Britain], Foot-and-Mouth Disease*, 1912, pts. 1, pp. 12; 2, pp. III-337).—This is the report of a committee of 11 appointed November 17, 1911, to inquire into the recent outbreaks of foot-and-mouth disease in England and to consider measures to prevent their recurrence. The committee also extended its inquiry to anthrax, since any measures as to imports which would be preventive of anthrax would also be effective against foot-and-mouth disease. The report takes up the history of foot-and-mouth disease in Great Britain, gives a description of it, and discusses experiments and research into foot-and-mouth and other diseases, preventive inoculation and experimentation with virus of a dangerous nature in Great Britain, origin of outbreaks, means by which the virus may be imported, etc.

The committee are of the opinion that all persons employed as knackers or slaughterers, as well as all owners of stock, should be required to report immediately any observed case of the disease. If hides and skins from infected countries are sterilized prior to shipment there will be no necessity of

cleansing and disinfecting holds of ships, trucks, and freight cars in or on which they have been carried. The sweepings of holds of ships are considered a source of danger, and it is recommended that they be destroyed or thrown overboard and not allowed to land.

The second part of this report consists of minutes of evidence and appendices in which are presented details of outbreaks of foot-and-mouth disease in each county of Great Britain, 1870 to 1911, a translation of a paper by B. Bang on foot-and-mouth disease, and a summary of passenger traffic to the United Kingdom from Europe. An index to the evidence of the 32 witnesses is also given.

The diagnosis of glanders by the complement fixation and the agglutination test, NEVERMANN (*Berlin. Tierärztl. Wchnschr.*, 27 (1911), No. 52, pp. 954, 955).—No case of glanders occurred after all animals detected with the blood tests had been removed. On the basis of blood tests 160 horses were destroyed, of which 134, or 83.7 per cent, were found to be glanderous.

The utilization of anaphylaxis for diagnosing glanders, H. MUESSNER (*Centbl. Bakt. [etc.], 1. Abt., Orig.*, 56 (1910), No. 5-6, pp. 537-542; *abs. in Centbl. Bakt. [etc.], 1. Abt., Ref.*, 49 (1911), No. 6, p. 177).—This test is considered of no value for diagnosing glanders.

Melitensis and *paramelitensis*, L. NÈGRE and M. RAYNAUD (*Compt. Rend. Soc. Biol. [Paris]*, 72 (1912), No. 18, pp. 791-793; *abs. in Ztschr. Immunitätsf. u. Expt. Ther.*, II, Ref., 5 (1912), No. 13, pp. 296, 297).—A coccus is described which culturally and morphologically strictly resembles the *Micrococcus melitensis*, but is distinguished from it by not agglutinating with a specific Malta fever serum. The serum obtained with this organism, on the other hand, will not agglutinate the *M. melitensis*.

Contribution to the diagnosis of tuberculosis (with the sputum) with the aid of the protein test, B. NICOLA (*Riv. Ig. e Sanit. Pub.*, 22 (1911), No. 8, pp. 235-237; *abs. in Ztschr. Immunitätsf. u. Expt. Ther.*, II, Ref., 5 (1912), No. 2, pp. 923, 924).—This is an investigation of the value of Roger's protein reaction.

The conclusion reached is that the test is a good one for detecting acute and chronic tuberculosis as long as the secretion is obtained from the lungs. A bronchial secretion will not give the test. Positive reactions may at times be obtained in lobular pneumonia, bronchial pneumonia, and in congestions which result from heart and kidney insufficiencies.

Action of certain glycerol esters upon the tubercle bacillus, A. T. SALIMENI (*Compt. Rend. Acad. Sci. [Paris]*, 155 (1912), No. 5, pp. 368-370).—In most of the tests the author utilized mono-, di-, and trichlorhydrin esters of glycerol.

In the preliminary tests it was found that mono- and dichlorhydrin dissolved the fatty material extracted with acetone from the tubercle bacillus in the cold; also a waxy substance extracted from the tubercle bacillus by chloroform, but insoluble in acetone. Trichlorhydrin ester dissolves these waxes and fats very rapidly.

As a result the author made a study of the behavior of the tubercle bacillus when treated with these esters. The trichlorhydrin ester destroyed the acid resisting powers of the tubercle bacillus and the organisms became granular and easily took the blue stains. The ester acted more strongly on the organism than either mono- or dichlorhydrin esters. A large quantity of the mass insoluble in the esters was soluble in water.

The action of certain products obtained from the tubercle bacillus, B. WHITE and O. T. AVERY (*Jour. Med. Research*, 26 (1912), No. 2, pp. 317-356).—Tuberculo-protein treated by the method of Vaughan yields a poisonous substance (called toxophore by Vaughan), which, in suitable doses, produces in

normal guinea pigs an intoxication resembling, if not identical with, the specific immediate protein intoxication in hypersensitive pigs. The gross pathological findings appear to be similar in both conditions. The minimum fatal dose of 2 preparations was 1 part to 15,000 parts of body weight. Boiling for 1 minute with filtration does not affect the potency of the watery solution.

"Fatal doses of the poison cause an abrupt fall in temperature. Smaller amounts (up to 0.01 gm. for pigs from 200 to 250 gm.) are apparently without appreciable effect on the body temperature. Under the experimental conditions noted, repeated increasing doses of poison fail to render animals immune to a minimum fatal dose. Survival from a large intravenous dose of the poison apparently renders the animal refractory, for 48 hours at least, to an amount in excess of that required to kill. Fresh brain, lung, and liver tissue, under the conditions noted, showed no binding or neutralizing affinity for the poison. Normal guinea pig serum has little if any destructive action on the cell poison. Intradermic injections of 0.00005 gm. of the poison produced no local reactions in normal or sensitized pigs.

"Atropin sulphate protected 75 per cent of the animals from a synchronous injection of fatal amounts of poison. Morphin sulphate aborts the acute symptoms and delays death, and in 2 cases completely protected from fatal intoxication. Chloral hydrate protected many of the animals against an otherwise fatal dose of the poison, and inhibited the acute manifestations and delayed death in others. Lecithin emulsion injected simultaneously with the poison seems to possess a slight and irregular prophylactic action. Incubation of the poison with lecithin emulsion for 1 hour at 27.5° C. increases this neutralizing property. A dose of 1:12,000 of the poison was not affected. The preliminary administration of lecithin protected some of the animals, delayed death in others, and was without effect in the remainder. The results were too incon-
stant to warrant definite conclusions."

A bibliography embracing 17 titles is included.

Protective vaccination against tuberculosis with killed tubercle bacilli contained in reed sacks, G. HEYMANS (*Deut. Med. Wchnschr.*, 38 (1912), No. 23, pp. 1081, 1082; *abs. in Ztschr. Immunitätsf. u. Expt. Ther.*, II, Ref., 5 (1912), No. 13, p. 317).—Living tubercle bacilli when contained in these sacks migrate through the capillaries of the vegetable vascular tissues (bacterial ultradiapedesis). By treating the reed sacks with collodion this migration can be stimulated or inhibited.

Tubercle bacilli killed with alcohol are well borne up to 1 gm. of substance by sound or tubercular animals. In some instances immunizing properties (protective and curative) were noted.

The treatment of tuberculosis with paratoxin, G. LEMOINE (*Rev. Mod. Méd. et Chirurg.*, 10 (1912), No. 1, pp. 6-11; *abs. in Internat. Centbl. Gesam. Tuberkulose Forsch.*, 6 (1912), No. 7, pp. 365, 366).—Paratoxin is an extract of the gall and contains lipid-like substances which possess an antibacillary power. They probably exert their power in conjunction with the phagocytes. Several thousand patients treated with this preparation showed a decrease in bacterial toxemia, which was probably due to a diminution of the number of bacteria in the body.

Tuberculosis in cattle (*Brit. Med. Jour.*, 1912, No. 2692, pp. 263, 264).—A statistical and general discussion by Delépine and Wilson in regard to the occurrence of tuberculosis in Germany, France, Great Britain, and Denmark at a conference of the veterinary association held at Melbourne.

The agglutination test in the diagnosis of bovine contagious abortion J. McFADYEAN and S. STOCKMAN (*Jour. Compar. Path. and Ther.*, 25 (1912),

No. 1, pp. 22-38).—Continuing work previously noted (E. S. R., 22, p. 584), the authors now report results of further tests with nearly 700 animals. In their opinion the test has now passed the probationary stage and deserves to be adopted as a method for diagnosing suspected cases of contagious abortion.

Tuberculosis in the goat. M. G. MOREL (*Hyg. Viande et Lait*, 5 (1911), No. 11, pp. 642-646).—This article points out the dangers which surround the utilization of raw milk obtained from tuberculous goats.

Experiments to determine the safe dose of white arsenic, Cooper's dip, and bluestone for sheep. A. THEILER (*Agr. Jour. Union So. Africa*, 3 (1912), No. 3, pp. 321-351, figs. 2).—The author has conducted a large series of experiments on sheep with a view to determining the maximal reliable dose of these drugs and mixtures thereof, which are frequently used in South Africa for the treatment of many diseases of all classes of domesticated stock, but more particularly in the treatment of sheep affected both with wireworms and tapeworms.

"It appears that arsenious oxid in the dose of 15, 30, and 45 grains is a safe dose for sheep, but it would not be wise to use the largest dose on a great number of sheep. . . . Cooper's dip administered to sheep in the doses of 15 grains had no fatal effect on 30 sheep. The 15 sheep belonging to the lot of 'watered 24 hours previous to and after dosing' were noticed to be 'off feed' the day following. With the dose of 30 grains, 48 sheep were dosed and 1 died the day following. . . . The dose of 22 grains bluestone appears to represent a safe dose for sheep; it may probably be slightly increased. The dose of 45 grains and more may cause death. . . . The dose of 30 grains white arsenic, mixed with 30 grains of bluestone, does not appear to be a safe dose for sheep. . . . The dose of 15 grains of Cooper's dip, added to 15 grains of bluestone, given in a mixture, seems to be a safe dose for a sheep. . . . A safe dose of a mixture of Cooper's dip and bluestone, when mixed with 2 substances which are considered to be harmless, such as salt and sulphur, became toxic, and caused death amongst the treated sheep."

The details of the post-mortem lesions in the 2 sheep which died from poisoning by arsenious oxid are presented in an appendix.

The importance of hog cholera and the production of hog-cholera serum. F. A. BOLSER (*Amer. Vet. Rev.*, 40 (1912), Nos. 5, pp. 611-618; 6, pp. 765-771).—This is a discussion of the history, geographical distribution, pathology, symptoms, and methods of treatment. It also discusses the preparation of the Dorset-Niles serum against hog cholera and describes its use.

Hog cholera. (*Ann. Rpt. Bd. Live Stock Comrs. Ill.*, 25 (1910), pp. 66-70, pls. 4).—This is a discussion of the nature of hog cholera, its distribution in Illinois, and the methods of preparing and using prophylactic hog-cholera serum.

Protective vaccination against hog cholera. J. GYÁRFÁS (*Állatorvosi Lapok*, 55 (1912), No. 25, p. 291-293; *abs. in Berlin. Tierärztl. Wchnschr.*, 28 (1912), No. 31, p. 569).—Vaccinations were made with the Hutya hog-cholera serum and 1,592 hogs. Previous to the vaccination 14 hogs died and the epizootic was considerably advanced. After vaccination 353 animals died. In another locality out of 478 pigs vaccinated 2 died, and in a third barn where the vaccinations involved 507 head the loss was 9.4 per cent. The serum has no curative action according to the author.

Some investigations in regard to hog erysipelas, immune serum, and its action in the animal body. H. HOLTH (*Maanedskr. Dyrlæger*, 24 (1912), No. 6, pp. 145-179; *abs. in Berlin. Tierärztl. Wchnschr.*, 28 (1912), No. 31, pp. 568, 569).—Hog erysipelas immune serum does not possess any bactericidal properties, but contains relatively large amounts of specific agglutinins and ambo-

ceptors. Its activity depends upon the presence of antiaggressins which are antagonistic to the cellular toxins produced in the organism (body). Erysipelas serum stimulates phagocytosis only indirectly.

Tuberculosis of hogs, J. R. MOHLER and H. J. WASHBURN (*U. S. Dept. Agr., Bur. Anim. Indus. Circ. 201*, pp. 40, figs. 5).—This is a revision of Circular 144 previously noted (*E. S. R.*, 20, p. 982).

Autotherapy—its application in the treatment of septic diseases in the horse, D. J. MANGAN (*Amer. Vet. Rev.*, 41 (1912), No. 4, pp. 422-433).—Autotherapy, as proposed by Duncan, consists chiefly of the administration of crude autogenous pus. This method was tried with 12 horses, chiefly pyogenic infections, and possesses the advantage of not necessitating the preparation of a vaccine in a culture medium which is foreign to the organism. The results obtained were in most instances good.

Chronic catarrh in the uterus in a mare, V. S. PSCHORS (*München. Tierärztl. Wchnschr.*, 55 (1911), No. 5, p. 70; *abs. in Vet. Rec.*, 23 (1911), No. 1192, p. 720).—A case diagnosed as uterine catarrh was found in a mare which would not breed and from the uterus of which a liter of whitish yellow stringy discharge was obtained. Aspiration with a catheter removed a bulk of 4 liters of fluid.

For treating the condition 5 liters of a solution of creolin was injected (dilution not given) and drained out. Then $\frac{1}{2}$ liter of a 2 per cent protargol solution was given in the same manner, but left in the uterus. After the fourth day no discharge was present, and none has been seen since.

What is the deadly new horse disease? (*Twentieth Cent. Farmer*, 1912, No. 615, pp. 6, 7, figs. 5).—A discussion of the outbreak of so-called cerebrospinal meningitis, which during the third week in August became epidemic in central and western Kansas and during the last week in the month crossed into Nebraska.

It's a pasture disease that is killing the horses (*Farmers Mail and Breeder*, 42 (1912), No. 27, pp. 3, 16, 17, figs. 2).—This paper discusses the occurrence of the disease of horses in Kansas and Nebraska noted above.

Intracellular bodies associated with equine anemia, W. B. MACK (*Proc. Amer. Vet. Med. Assoc.*, 48 (1911), pp. 378-382, pl. 1).—In a bulletin on equine anemia, previously noted (*E. S. R.*, 21, p. 584), the author referred to certain spherical bodies observed in the red blood corpuscles of individuals suffering from the disease. A further study has shown them to be present in every case of equine anemia studied and that they stain well by certain methods.

"In blood films properly fixed and stained they appear within the red corpuscles as small 'coccus-like' bodies or points, stained an intense, deep blue. They vary in size from about $1\ \mu$ in diameter to the smallest visible points. The form most frequently encountered is from about $\frac{1}{2}$ to $1\ \mu$ in size, spherical in form, with outlines definite and clean cut. Slightly elongated forms occasionally occur. As a rule a corpuscle contains but 1, rarely 2 are found in the same cell. In some instances where 2 are included in a corpuscle they lie close together, apparently in contact, others are separated by about one-half the diameter of one of them, others again are more widely separated. In a majority of such instances the bodies or granules are about equal in size, but sometimes one of them is slightly larger than the other. Some of these bodies lie near the center of the corpuscle, others toward or at the periphery. Occasionally one appears to protrude from the cell containing it. Bodies identical in size, form, and staining reaction are frequently found outside the corpuscles, i. e., free in the fluid portion of the blood.

"Of the smaller forms frequently 2 or 3, rarely as many as 5 or 6, are found within a corpuscle, usually some distance apart. In such instances they may

be equal in size or one may be distinctly larger than the others. Frequently the space between them is stained less intensely than the remainder of the corpuscle and this somewhat clearer space bounded by faint, thread-like lines with just a suspicion of blue stain in them.

"Occasionally ring-shaped bodies, faintly defined, with a slightly bluish tint, are observed with usually 1, rarely 2 or 3, deeply stained granules situated at the periphery of the ring. They are very minute and easily overlooked. Whether the smaller forms bear any relation to the larger, 'coccus-like' bodies first mentioned remains to be determined. These bodies may be seen in slides fixed in methyl alcohol and unstained. . . .

"The frequency with which these bodies occur varies widely in different cases. In some they are comparatively few, in numbers, in others numerous. . . . A diligent search for them in blood films prepared from several supposedly normal horses, several affected with pneumonia, influenza, strangles, etc., and from several surgical cases has failed to reveal them."

The "coccus-like" form is said to quite closely resemble the description and photographs of the protozoan genus *Anaplasma* described by Theiler as the cause of gall sickness in South African cattle. It is suggested that these bodies may be found to represent a new species of *Anaplasma*.

In sections of the liver from a typical case of equine anemia, stained by the Gram-Weigert method, the author found inside the hepatic cells certain very minute, ring-shaped bodies with a small granule at one side, at the periphery of the ring. Search for them in sections of liver from several animals where the liver showed various types and degrees of degeneration resulted negatively. The author thinks these ring-shaped bodies to be too definite and too uniform for degeneration products, as supposed by Todd and Wolbach (E. S. R., 25, p. 89) in work with swamp fever.

Studies on the etiology of equine influenza, N. S. FERRY (*Vet. Jour.*, 68 (1912), No. 442, pp. 185-197).—The data presented in this paper, which was read at the meeting of the Society of American Bacteriologists at Washington, D. C., in December, 1911, have been noted from another source (E. S. R., 27, p. 58).

The etiology of equine influenza (*Vet. Jour.*, 68 (1912), No. 443, pp. 246-248).—This is a review of the paper noted above.

Glanders of the lungs in horses with some notes on the serological detection of the disease, SCHÜTZ (*Centbl. Bakt. [etc.]*, 1. Abt., Orig., 64 (1912), *Festschrift F. Loeffler*, pp. 87-99).—The glanderous nodules in the lungs of horses are either hematogenic or bronchogenic in origin. The following varieties of pulmonary infections with the glanders bacillus are mentioned and discussed in detail: (1) A glanderous cellular or cellular fibrinous inflammation of the lungs; (2) chronic (glanderous) indurative pneumonia and broncho-pneumonia; and (3) purulent bronchitis and peribronchitis. Mixed infections are also described. The agglutination and complement fixation tests are good methods for detecting this disease in horses.

A contribution on the treatment of contagious pneumonia of the horse with salvarsan, JACOB (*Ztschr. Veterinärk.*, 23 (1911), No. 8-9, pp. 406-411; *abs. in Berl. Tierärztl. Wchnschr.*, 28 (1912), No. 32, p. 588).—In all of 12 cases of the pectoral form of influenza (brustseuche) in which the author administered salvarsan intravenously the temperature sank to normal within from 15 to 24 hours and continued so.

Bovine variola in chickens, O. CASAGRANDE (*Rev. Internat. Vaccine*, 1 (1910), No. 1, pp. 1-27, pls. 3; *abs. in Bul. Inst. Pasteur*, 9 (1911), No. 21, pp. 939, 140).—By inoculating the vaccine upon the skin or epithelium of chickens, which has been scarified or rubbed with sandpaper, the specific lesions (Cy-

toryctes) were produced. Young chickens were more susceptible to the vaccine than older birds. The skin of the thorax was particularly susceptible, more so than that of the wattles. The cornea was less sensitive. By inoculating the skin of the thorax many times successively immunity could not be produced, but inoculating a part of the wattle immunized the bird entirely. The author believes that chickens can be used for controlling vaccine virus.

An investigation of an outbreak of septicemia in poultry, R. A. WHITING (*Amer. Vet. Rev.*, 41 (1912), No. 4, pp. 456-459).—A mortality of about 90 per cent in a flock consisting of 70 chickens and 12 turkeys was caused by an organism of the hemorrhagic septicemia group.

In regard to the growth and virulence of the organisms causing tuberculosis in fowls, C. WALTHER (*Arch. Path. Anat. u. Physiol. [Virchow]*, 201 (1912), No. 1, pp. 140-148; *abs. in Ztschr. Immunitätsf. u. Expt. Ther.*, 11, Ref. 5 (1912), No. 3, p. 19).—There are strains of the avian tubercle bacilli which culturally resemble the human type of bacilli, and which on inoculation (crude material or fresh cultures) show a high virulence for guinea pigs. After cultivating these organisms for a longer time than usual on artificial media, the strains become more like the regulation avian tubercle bacilli. No appreciable reduction in virulence, as noted by other workers, could be determined.

RURAL ENGINEERING.

Irrigation: Its principles and practice as a branch of engineering, H. BROWN (*London*, 1912, 2. ed., rev., pp. XV+301, pls. 9, figs. 68).—This work deals with the practice of irrigation as a branch of engineering, sets forth the fundamental principles that should govern such practice and furnishes illustrations of their application to existing canal systems. It contains chapters on irrigation and its effects; basin irrigation; perennial irrigation and water duty; sources of supply; dams and reservoirs; methods of construction; means of distribution; masonry works; methods of distribution, assessment of rates, and administration; river training; agricultural operations and reclamation works; and navigation.

Some methods of measuring irrigation water practiced by the United States Reclamation Service (*Engin. and Contract.*, 38 (1912), No. 8, pp. 215-217, figs. 13).—This is an abstract of a paper read by W. G. Steward before the Idaho Engineering Society, in which he describes canal, weir, and automatic gages, and gives discharge tables and discharge curves for different weirs and orifices used in water measurement under varying circumstances.

Irrigation: California, R. P. TEELE (*Washington: Bur. Census [U. S.]*, 1910, pp. 14, figs. 2).—This article contains irrigation statistics for California dealing with the farms, acreage, and crops irrigated, irrigation works, and the cost of construction, operation, and maintenance.

Twenty-second annual report of the hydraulic engineer, J. B. HENDERSON (*Ann. Rpt. Hydraul. Engin. Queensland*, 29 (1911), pp. 22+63, pls. 36). This reports the results of irrigation, power, and underground water investigations and surveys, and gives rainfall and hydrographic data and maps.

Experiments on the use of water for irrigation in South Africa, J. MOLLAT (*Bul. Agr. Congo Belge*, 3 (1912), No. 2, pp. 481-497, figs. 2).—A discussion of the methods of irrigation employed, the duty of water, the drainage of irrigated soils, and the amount and frequency of irrigation required to satisfy the crops and soil conditions in South Africa.

Construction difficulties in the draining of irrigated lands, R. A. HARRIS (*Nat. Land and Irrig. Jour.*, 6 (1912), No. 2, pp. 23-27, figs. 6).—It is stated

that the nature of the soil itself is one of the chief factors tending to make the construction of drains in irrigated lands extremely difficult, and that where open ditch drains are required great difficulty is experienced in constructing them so that they will hold their shape. Because of this, covered tile drains are much more desirable in irrigated lands than open drains. The methods of design and construction of tile and open drains, intended to overcome as nearly as possible the difficulties presented by the soil conditions, are outlined.

[Methods of the preliminary organization of a 450,000-acre drainage and levee project in southeastern Missouri], L. T. BERTHE (*Engin. and Contract.*, 38 (1912), No. 5, pp. 131-133, fig. 1).—This article outlines the conditions and methods of bringing about the organization of this project, including a description of the district and its organization. The preliminary cost estimate was \$2,585,000.

The scoop wheel as the pioneer for the drainage of lowlands, J. D. BECK (*La. Planter*, 49 (1912), No. 9, pp. 141, 142, fig. 1).—A discussion of the design, construction, and operation of the scoop wheel as used in drainage reclamation, outlining in detail the design of a 27 ft. wheel which has a possible actual discharge of 7,153 cu. ft. per minute at low lift. Several installations in operation in different localities are described, giving efficiencies ranging from 33 to 89 per cent.

Drainage by explosives, A. MACPHERSON (*Jour. New Zeal. Dept. Agr.*, 5 (1912), No. 2, pp. 126-133, figs. 3).—This reports the results of experiments on the dynamiting of pakhi soil for drainage in Westland, New Zealand.

The soil was from 11 to 21 in. deep, above 2 or 3 alternate layers of hard packed sand and boulders on cement formation and iron pan from 9 to 22 in. in thickness, with a porous substratum of free sand, shingles, and boulders several feet in depth. The charge holes were bored 4 ft. apart, into and through the hard bottom. The first 2 plats were charged with 2 sticks of dynamite per hole, the third and fourth plats with 3 and 4 sticks, and the fifth and sixth plats with 5 sticks per hole.

The iron pan was not fractured by the explosion in any of the plats, holes about 1 ft. in diameter being the extent of its operation, yet the drainage through these holes has so far been fairly successful.

Roads, paths, and bridges, L. W. PAGE (*New York*, 1912, pp. XIV+263, pls. 24, figs. 12).—This book gives in concise and elementary form the fundamental principles governing the construction of roads, paths, and bridges for farm and neighborhood purposes, and outlines in detail the selection of material and methods of construction and maintenance. It contains chapters on the history of road building; road legislation and administration; locations, surveys, plans, and specifications; earth, sand-clay, gravel, and broken stone roads; selection of materials for macadam roads; maintenance and repair; roadside treatment; modern road problems; paths; and culverts and bridges.

Handbook for highway engineers, W. G. HARGER and E. A. BONNEY (*New York and London*, 1912, pp. XIV+493, figs. 85).—This book contains in compact form information ordinarily required in the field and office practice of road design and construction. It contains data for the inexperienced engineer or commissioner on the relative importance of the different parts of the design and the possibilities of economy without impairing the efficiency of the roads, and also cost data useful to anyone engaged in road work.

A third report on the public roads in Georgia, S. W. MCCALLIE (*Geol. Survey Ga. Bul.* 28, 1912, pp. 12).—A report of the mileage of and expenditures on public roads in Georgia, given by counties for the year 1911, and calling attention to the increase in road mileage and to the profitable use of convict

labor. The total mileage is given as 34,986 miles; and the total expenditure on roads and bridges during 1911 as \$4,127,899.

Practice of the Massachusetts Highway Commission in the construction and maintenance of state highways (*Engin. and Contract.*, 38 (1912), No. 3, pp. 208, 209).—This is an abstract of a paper read by A. W. Dean before the Boston Society of Civil Engineers in which he describes the methods of construction and maintenance of the state highways of Massachusetts, more especially of bituminous and bituminous macadam roads.

An investigation of the road making properties of Missouri stone and gravel, W. S. WILLIAMS and R. W. ROBERTS (*Univ. Mo. Engin. Expt. Sta. Bul.*, 2 (1911), No. 3, pp. 70, figs. 10).—Descriptions of the abrasion, cementation, impact, hardness, toughness, and absorption tests as applied to Missouri stone and gravel are followed by the results of investigations in each county and tabulated data giving the results of tests on the materials.

Limestone is the most abundant road material in the State, but only about 33 per cent of it will stand all the tests. It has good cementing qualities, however, and can be used as a base for macadam. The best road materials found are the granites, rhyolite, and porphyry, which have good cementing qualities and may be used for wearing surfaces. The gravel in the State is chiefly chert and flint and is classed as poor road material.

The road building materials of Coshocton County, Ohio, F. H. EGO (*Ohio State Univ. Bul.*, 16 (1912), No. 37, pp. 29, pls. 10, fig. 1).—This bulletin discusses the road materials of this county, presents simple effective methods for using them for road improvement at a reasonable first cost, and gives the results of standard tests on these materials of which the largest part is limestone, gravel, and sandstone. The conclusions are that although this county does not have an abundance of permanent road material, by carefully selecting the best available material and following approved methods of construction under the direction of a competent engineer, good roads may be secured at reasonable first cost and farm values may be increased.

Methods of testing road making materials in European countries (*Engin. and Contract.*, 38 (1912), No. 11, pp. 293-298, fig. 1).—This is an abstract of a report by A. Mesnager to the International Association for Testing Materials, containing a list of the road building materials used and an outline of the methods employed in testing them in Germany, Austria, Belgium, Denmark, Budapest, Norway, and the Netherlands.

Road maintenance problems, J. G. POWELL (*Surveyor*, 42 (1912), No. 1075, pp. 271, 272).—An extract from the annual report of the county engineer of Wiltshire, England, stating that the chief difficulties encountered in road maintenance are the heavy traffic and consequent wear and tear on the roads during periods of alternate frost and thaw, the existence of soft, yielding subsoil for road beds, the high growth of hedges and trees, and the wear produced by the increased number of mechanically propelled vehicles. It is further stated that roads to bear motor vehicle traffic must have new unyielding subsoils as well as resurfacing, and that flint for surfacing is cheaper and more satisfactory than limestone in this locality.

Reinforced concrete design, O. FABER and P. G. BOWIE (*London, 1912, pp. XIX+532, figs. 160*).—This book presents the fundamental principles underlying the practical design of reinforced concrete, which are to be used in connection with practical work and in experiments in determining the proper design to suit any local conditions. It deals with several important new considerations among which are the ratio of live to dead load as affecting the bending moment of beams, and the relative stiffness of beams and columns.

Dynamite on the farm (*Agr. Jour. Union So. Africa*, 3 (1912), No. 6, pp. 382-386).—This article notes the results obtained by subsolling with gelignite, a high velocity explosive, and with specially prepared agricultural dynamite, a low velocity explosive. In using the gelignite the charges were sunk from 3½ to 5½ ft., the best results being obtained from the shallower charges. The dynamite gave much better results than gelignite, since, as a low velocity explosive, it pulverized the subsoil over a much larger area. The facts as noted indicate that for success and safety the work must be carefully and properly handled. "Rules of thumb" must be avoided and nothing but the correct implements and explosive to satisfy local conditions must be used.

Study of agricultural machinery, M. ESTRADA (*Bot. Min. Agr. [Buenos Aires]*, 14 (1912), No. 4, pp. 337-344).—A discussion of experimental work on agricultural machinery in Argentina and the United States and of agricultural engineering education in the United States, dealing especially with motor machinery, rural architecture, sanitation, irrigation, and drainage.

How the plow hitch affects draft (*Threshermen's Rev.*, 21 (1912), No. 3, pp. 9, 44, 46, 48, figs. 3).—A graphical and mathematical analysis of draft and a few suggestions pertaining to the hitching of engine gang plows are given.

The conclusions are drawn that the best results are obtained by making the hitch a little to the right of the center of the plow and by hitching as high on the engine as possible without carrying the front end of the plow off the ground, and that the larger the plow the more economical it is in power. From the graphical analysis the formula is deduced for the desired hitch for any sized plow of $D = \frac{AC}{2O+B}$, in which D = the distance in inches from the first plow center to the hitch, A = distance from the center of the first plow to the center of the last plow, measured at right angles to the furrow, B = the distance from the center of the first plow to the center of the last plow, measured parallel to the furrow, and O = the distance in inches from the front plow bottom to the engine draw bar. For practical conditions 12 in. should be added to D .

Fifth Winnipeg motor contest, P. S. ROSE (*Amer. Thresherman*, 15 (1912), No. 5, pp. 9-11, figs. 18).—This contest was primarily one of fuel economy, being divided into 3 main divisions: (1) a 2-hour economy brake test during which the engines were supposed to run under their most economical load and have determinations made of the fuel required per horsepower hour; (2) a 4-hour maximum brake trial under maximum load, with a fuel and water consumption determination; and (3) a plowing test in which each tractor was given a certain amount of land to plow and accurate records were kept of fuel consumption.

The tractive efficiencies as determined were very high, due to the good ground condition, the gas tractors giving efficiencies from 59 to 88 per cent. The steam engines showed considerably lower efficiencies. The results and accompanying data indicate a 25 per cent increase in average economy since 1910, due principally to advancement in the art of engine building, which is sufficient also to counteract the advance in price of gasoline.

The status of the motor plow question in Germany, MARTINY (*Kühn Arch.*, 2 (1912), pt. 1, pp. 193-220, figs. 12).—A general discussion of the theory of operation of the motor plow, presenting graphical and mathematical explanations of the losses by sinking and slipping of drive wheels in different types, the action of plowshares in different hitches, etc., followed by the results of practical experiments and by discussions of the efficiency, practicability, and flexibility of various types.

Tests of motor plows, B. MARTINY (*Mitt. Prüf. Stat. Landw. Masch. u. Geräte, Halle, 1912, No. 163, pp. 46, fig. 1*).—The methods and results of tests are given of 3 types of motor ground breaker, namely, the ordinary motor plow, the motor plane plow, and the combination motor and rotary ground breaker. A general discussion is given of the methods of motor operation and draft employed by different makes, the power required, and the results obtained under varying conditions of soil and weather.

Agricultural motor trials in Algeria (*Impl. and Mach. Rev., 38 (1912), No. 449, pp. 651-653, figs. 5*).—This article compares the results of several sets of plowing trials on motor tractors taken at different times of the year under varying conditions of soil and atmosphere. The results show the fallacy of judging the machines and overestimating the results as obtained from the tests of only 2 or 3 days' duration, as has been the custom, and indicate that a comparison is only possible when the machines are employed for various conditions of work over the greater part of the year.

Gasoline as a fuel for motor use (*Farm Machinery, 1912, Nos. 1087, pp. 32, 34; 1088, pp. 30, 32; 1089, p. 16*).—This is a scientific study of the different grades of gasoline, indicating that gravity is no criterion as to the quality, as is commonly accepted, but that the quality of a gasoline is expressed by its initial, intermediate, and maximum boiling points.

The ordinary gasoline has several boiling points, portions of it vaporizing at low temperatures and others at from low to high temperatures. For easy starting, a gasoline engine requires a gasoline with low initial boiling points, but as it warms up it requires higher and higher boiling points in the gasoline to satisfy the increasing demand for power, consequently gasoline to produce the best results in a motor must have low initial boiling points, gradually rising to high boiling points. A high-gravity gasoline is no better than a low-gravity gasoline if they have the same boiling points.

Steam or electricity in dairy work (*Molk. Ztg. [Hildesheim], 26 (1912), No. 58, pp. 1087, 1088; Landw. Masch. u. Geräte, 12 (1912), No. 17, pp. 1-7*).—A comparison of the uses of steam and electricity in an average small dairy, giving the daily and yearly cost figures for the operation of a 10-horsepower steam engine and an .8-horsepower electric motor. It indicates that electric power must cost as low 2½ cts. per kilowatt-hour in order to give the economy of steam when both machinery driving and milk and water heating are taken into consideration.

Library of Agriculture—Country life conveniences and enjoyments, edited by H. M. SKINNER and A. L. MCCREDIE (*Chicago, 1912, vol. 8, pp. 502, figs. 61*).—This book is made up chiefly of reprints of Farmers' Bulletins of the U. S. Department of Agriculture.

RURAL ECONOMICS.

[Questions relating to rural economics], H. L. RUSSELL ET AL. (*Bul. Univ. Wis., 1912, No. 509, pp. 125, figs. 24*).—This bulletin presents the papers given at the Second Wisconsin Country Life Conference conducted under the auspices of the College of Agriculture of the University of Wisconsin. Among those relating directly to the economic side of country life the following are noted: Value of Cooperation Among Farmers, by G. F. Comings; Efficient Use of Labor on the Farm, by H. C. Taylor; Hired Labor on the Farm and in the Home, by W. L. Nelson, and The Decline in Rural Population, by R. H. Hibbard. Financing the farm, M. T. HERRICK (*Addresses Ann. Meeting Ohio Bd. Agr., 1912, pp. 28-43*).—An address delivered at the annual meeting of the Ohio State Board of Agriculture, Columbus, Ohio, January 10, 11, 1912, in which the author illustrates the economic significance of scientific methods in farming by statistics.

of the production per acre of the leading crops in countries where such methods have been applied and where not applied. He also draws attention to the part played in Germany and France by agricultural cooperative societies in promoting scientific farming by teaching farmers to appreciate the possibilities of scientific methods, and by supplying them with funds to make the needed changes and improvements. He discusses at length the systems of agricultural credit in France and Germany and their possible application to conditions in the United States.

Agricultural cooperation in Ireland, C. Fox (*Prog. Farmer*, 27 (1912), Nos. 30, pp. 11, 18; 31, pp. 11, 19).—This is a popular article describing in more or less detail the work of cooperative credit banks, cooperative creameries, poultry societies, etc., in Ireland, with suggestions as to the possible application of the principles involved in the South.

Live stock improvement syndicates in France and recent state encouragement (*Internat. Inst. Agr. [Rome], Bul. Bur. Econ. and Soc. Intel.*, 3 (1912), No. 5, pp. 15-31).—This article gives special attention to the active movement of syndicates in live-stock improvement in France, and the recent encouragement from the government and various public bodies.

The chief objects of the syndicates are the purchase and maintenance of good bulls, the keeping of herd books and records of performance, and assisting in the sale of stock. To encourage the movement the French government voted 200,000 francs to be used in promoting the work of the live-stock improvement syndicates in 1912. The syndicates are also permitted to receive subsidies under certain conditions. The appendix contains the rules adopted by some of the syndicates.

How the sale of live stock is organized in Austria (*Internat. Inst. Agr. [Rome], Bul. Bur. Econ. and Soc. Intel.*, 3 (1912), No. 7, pp. 3-12).—This article describes the work of the general federation of the agricultural cooperative societies of Austria in the marketing of live stock for individual breeders.

Reliable agents residing in the principal centers of production are employed to collect the live stock which individuals have for sale and forward it to the "Viehverwertungsstelle" of some city. Here the agents of the federation sell the animals to the best advantage, and after deducting expenses, but without any commission charges, forward to the breeders the returns. This method of marketing enables the isolated breeder to take advantage of the better terms offered by the large markets and thus secure for himself profits which would otherwise go to the middleman. The value of live stock sold in this way increased from about \$37,000 in 1907 to about \$2,635,000 in 1911.

A detailed account of the actual workings of a number of these associations, together with the encouragement given by the State, is also given.

The German potash industry and potash legislation, J. SCHÖNEMANN (*Die Deutsche Kali-Industrie und das Kaligesetz. Hanover, 1911, pp. VII+152, pls. 10*).—This publication presents a detailed discussion of the importance of the German potash industry; the motive of legal regulation of the industry; history of the legislation, and its economic significance as applied to the mine owner, manufacturer, dealer or consumer, and laborer; its influences upon foreign countries; and the treatment of contracts with American trusts.

Agricultural reciprocity between America and China, G. W. GBOFF (*Canton Christian Col., Dept. Agr. Invest. Bul. 5* [1912], pp. 40, figs. 34).—This bulletin deals with a comparison of American and Chinese agricultural methods, states the opportunity for mutual helpfulness, suggests the field for service, and outlines an organization through which the work may be accomplished.

The original home of agriculture of the Indo-Germanic people, R. BRAUN-KART (*Die Urheimat der Landwirtschaft aller Indogermanischen Völker. Heidel-*

berg, 1912, pp. VIII+470, pl. 1, figs. 266).—A history of the agriculture of the ancient inhabitants of Europe and Asia, presented in the form to support the view that the agriculture of the Indo-Germanic tribes had its origin in central or northern Europe. The work is the result of many years' study of the cultivated plants and primitive farming implements.

Annual and average production of and international trade in important agricultural products, by countries, R. T. MCKENNA (*U. S. Dept. Agr., Bur. Statis. Circ. 31, pp. 30*).—This circular presents a compilation from the Year-books of this Department of data showing the annual and average production of important agricultural products in the leading agricultural countries, with the percentage each contributes to the total annual production, together with similar data respecting exports and imports of certain agricultural products.

Crop Reporter (*U. S. Dept. Agr., Bur. Statis. Crop Reporter, 14 (1912), No. 7, pp. 49-56*).—Notes and statistics are here presented showing the acreage and condition of the leading crops in the United States July 1, by States, with comparisons; acreage and estimated production of wheat, rye, barley, and oats in various countries as shown by the report of the International Institute of Agriculture; distribution of the land area in continental United States, 1910; farm value of important products; condition of cereals in various foreign countries June 1; temperature and precipitation statistics; acreage and condition of tobacco by types July 1; monthly receipts and stocks of eggs and poultry in the United States; and the range of prices of agricultural products at important markets; the text of a recent act relating to the issuing of cotton reports; and other data.

Improving Canadian agriculture, J. W. ROBERTSON (*Com. Conserv. Canada Rpt., 3 (1912), pp. 89-105*).—Observations are here made regarding systems of agriculture in Canada and methods of improving them, as the result of a survey of 1,212 Canadian farms by the Commission of Conservation, appointed to inquire into and report on questions relating to conservation of soil fertility, agricultural labor, health, and prosperity of the country.

It is noted that a varying number of farms in each of the 9 Provinces investigated reported increases in the yield of crops as compared with 10 years ago except in Manitoba where no farms reported an increase, but 46 out of 100 reported a decided decrease. The general conclusion reached by the commission is that where a systematic rotation of crops prevailed there has been from two to three times the profit to the farmers and a conservation of fertility.

Agricultural survey [in Canada], 1911, F. C. NUNNICK (*Com. Conserv. Canada Rpt., 3 (1912), pp. 106-129, table 1, pls. 4*).—A brief summary of the agricultural conditions found in each Province by the Commission of Conservation is here presented, together with tables giving detailed figures relating to conditions found, and a reproduction of the question schedule used in the collection of the information. The following table presents figures relating to the number of farms, acreage, etc., investigated in each Province:

Number of farms, acreage, etc., investigated in 9 Canadian Provinces.

	Nova Scotia.	Prince Edward Island.	New Brunswick.	Quebec.	Ontario.	Manitoba.	Saskatchewan.	Alberta.	British Columbia.
No. of farms studied....	100	100	100	200	300	100	87	86	19
Total acreage.....	16,893	10,992	13,991	30,522	33,840	39,000	35,303	22,713	28,220
Field crop acreage.....	5,958	8,220	6,383	13,439	24,634	28,045	24,616	16,222	14,700
Cereal acreage.....	1,072	2,508	1,750	5,640	10,917	26,083	24,149	12,885	9,632
Hoe crop acreage.....	277	515	249	803	8,195	205	—	80	1,300
Hay and pastures.....	4,600	5,195	4,837	13,014	10,596	1,757	—	—	9,068

Agricultural statistics, 1911, R. H. REW (*Bd. Agr. and Fisheries [London], Agr. Statis., 46 (1911), No. 4, pp 275-375, fig. 1*).—This report contains detailed statistics of the imports and exports of agricultural produce into and from the United Kingdom and the returns of the trade in live stock between Great Britain and Ireland in 1911, with comparisons. The total value of the chief kinds of imported food, excluding sugar, rice, and lard, was £149,635,000, as compared with £27,835,000, as the average value for the 7 years 1856-1862. The greatest increase in quantity was meat, the over-sea supply increasing from 5.3 lbs. per head in 1856-1862 to 15.5 lbs. per head in 1905-1911.

General statistics in France (*Ann. Statis. [France], 30 (1910), pp. 102-104, 109, 110, 43*-45*, 182*-189**).—An official report giving detailed statistics regarding number and memberships of professional, industrial, commercial, and agricultural syndicates in France, June 1, 1910. The agricultural syndicates, according to the report, numbered 4,948, with a membership of 813,038, of which 14,720 were women. There were 77 unions of agricultural syndicates and 4,726 affiliated syndicates, with a membership of 1,067,417.

Other statistics are given as to number and work of mutual agricultural credit banks, together with data pertaining to various crops from 1815 to 1911 in France, including tables which show the area and production of wheat, oats, potatoes, etc., in various other countries from 1850 to 1911.

[Agricultural statistics of South Australia], L. H. SHOLL (*So. Aust. Statis. Dept. Bul. 1, 1912, pp. 16*).—This bulletin presents final results of the cereal, hay, and fodder crops in South Australia for the year 1911.

The total area under cereal cultivation was 2,907,182 acres, of which 2,607,206 acres was in wheat, which gave an average yield of 9.29 bu. per acre, a decrease of 2.28 bu. as compared with the previous year. The total value of the grain, hay, and fodder crops is estimated at £5,410,005.

[Live stock statistics of South Australia], L. H. SHOLL (*So. Aust. Statis. Dept. Bul. 2, 1912, pp. 4*).—In this report is shown the final results of live stock statistics in the various counties and divisions of South Australia for the year 1911. The cattle numbered 393,506, an increase of 8,704 over last year; horses 259,719, an increase of 10,393; sheep 6,171,907, a decrease of 96,570; and dairy cows 121,803, an increase of 2,175. The amount of butter made is reported at 9,094,866 lbs., a decrease of 1,022,820 lbs., and cheese 1,517,561 lbs., a decrease of 278,720 lbs. The butter exported amounted to 2,079,196 lbs., valued at £103,875.

AGRICULTURAL EDUCATION.

The educational value of agriculture, E. BARNES (*Advance print from Nat. Ed. Assoc., Proc. Dept. Superintendence, 1912, pp. 147-150*).—Some of the advantages of instruction in elementary agriculture when well given, according to the author, are as follows: (1) It commands from the start a wide range of the interests most common to children, (2) it forces measures and comparisons, and judgment thereon, upon the child at every turn, (3) it trains a child to be careful, exact, patient, and persistent, (4) it offers in the gardening work all the elementary problems of form, color, and proportion, and so lays the foundations of a sense of beauty, (5) it affords abundant opportunity for emulation and cooperation, and (6) it teaches boys and girls to work. Inasmuch as it discourages pure reasoning, students should also be taught pure mathematics, logic, and languages. The author points out that "our trouble in the past has been that we have tried to take our school children directly into this abstract world of exact thinking and exalted feeling without passing them

through the preliminary stages of concrete experience, elemental virtues, and "active self-expressions."

Report to the forty-seventh general assembly of the State of Illinois (*Springfield: Ill. Ed. Com., 1911, pp. 126*).—This is a report of the work to date of the Illinois Educational Commission, appointed by the governor in 1907 to examine into the need of changes in the school laws.

Among the recommendations of the commission is a comprehensive plan for providing vocational courses in the public schools of the State. It was also recommended that the high-school curriculum distinctly recognize the vocational needs of the pupil, to the extent of at least one-fourth of the student's time; that the nature-study work of the grades be of such a character as to prepare the child for an intelligent choice of his vocational course; and that schools be advised to ascertain to what extent pupils are engaged in duties outside of school, and in case such duties are definite and regular that proper credit should be given.

Third annual report of the Congressional district agricultural schools of Georgia, J. S. STEWART (*Bul. Univ. Ga., 1912, No. 188, pp. 39, figs. 2*).—The attendance for 1911 in the 11 schools was 1,338, representing 110 counties. The farm products for the year amounted to \$33,818. The schools own livestock valued at \$20,828, and farm tools valued at \$8,000.

The majority of the schools now charge less than \$10 a month for board, and require from 20 to 36 hours' work without pay. Additional work is paid for at 10 cents an hour.

Agricultural education in Canada, J. K. DOHERTY (*Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 3 (1912), No. 1, pp. 40-45*).—Brief accounts are given of the object and work of the Ontario Agricultural College, the Manitoba Agricultural College, Macdonald College, Saskatchewan University, Nova Scotia Agricultural College, and the Agricultural Institute of Oka, Quebec, and of the college extension work in Ontario.

Status of agricultural instruction (*Rap. Trien. Chambres Lég. Min. Agr. et Trav. Pub. [Belgium], 1906-1908, pp. XVIII+345*).—This is a report for the years 1906, 1907, and 1908, submitted by the Minister of Agriculture and Public Works to the legislative chambers of Belgium, on the collegiate, secondary, elementary, and itinerant instruction in agriculture, horticulture, and home economics; educational value of agricultural expositions; agricultural libraries; and inspection of agricultural instruction in Belgium. In the appendixes detailed information is given concerning the general organization, curriculum, government aid, experiments, faculty, publications, attendance, etc., of each institution under the direction of the department.

Agricultural instruction in Denmark, A. M. T. WESTERMANN (*Bul. Mens. Off. Renseig. Agr. [Paris], 11 (1912), No. 4, pp. 433-439*).—An account is given of the status of agricultural instruction in Denmark in 1909-10, including agricultural apprenticeships, agricultural instruction in the 58 secondary schools, itinerant agricultural instruction, agricultural instruction for soldiers, and higher agricultural instruction at the Royal Agricultural and Veterinary Institute at Copenhagen.

Report of the Alnarp Agricultural and Dairy Institute, 1911 (*Ber. Verh. Alnarps Ländtbr. och Mejeri Inst., 1911, pp. 32, pl. 1*).—This is a report on the work of the institute during the year.

Horticultural instruction in the Netherlands, K. SCHECHNER (*Land u. Forstw. Unterrichts. Ztg., 25 (1911), No. 3-4, pp. 316-319*).—The author gives an account of the system of horticultural instruction in the Netherlands, including higher instruction at the Royal Agricultural, Horticultural, and Forestry High School at Wageningen; secondary instruction at the horticultural

tural winter schools at Aalsmeer, Boskoop, Naaldwijk, and Tiel, and the Girard Adriaan van Swieten Forestry School at Fredericksoord; elementary instruction in special winter courses; special courses for adults; and courses for public-school teachers.

A new feature of agricultural instruction in Prussia (*Land u. Forstw. Unterrichts. Ztg.*, 25 (1911), No. 3-4, pp. 313-315).—An account is given of the object, organization, admission requirements, curriculum, etc., of the seminars for farmers being established by the chambers of agriculture in Prussia under the control of the Ministry of Agriculture, Domains, and Forests.

Statistics of education in the Kingdom of Württemberg for 1910 (*Statist. Unterr. u. Erziehungswe. Kgr. Württemb.*, 1910, pp. 70).—This publication includes statistics of the agricultural institutions in the Kingdom of Württemberg, viz, the agricultural high school and stations at Hohenheim, veterinary high school at Stuttgart, the farm schools at Ellwangen, Kirchberg, and Ochsenhausen, the viticultural school at Weinsberg, 8 agricultural winter schools, agricultural continuation schools, short courses, etc.

[Agricultural and forestry education in Austria and other countries] (*Land u. Forstw. Unterrichts. Ztg.*, 25 (1911), No. 3-4, pp. V+221-381).—In addition to several articles abstracted elsewhere in this issue, this report includes the following: The Problems of Moral and Religious Training in Elementary Forestry Instruction, by K. Pusch; Equipment and Profitableness of the Farms of Agricultural Education Institutions in Austria; Review of Agricultural Literature and of Annual Reports of Agricultural and Forestry Education Institutions for 1910-11; and miscellaneous notes.

The objects of the experiment; farm of the Royal Imperial Agricultural High School, ADOLF RITTER VON LIEBENBERG (*Land u. Forstw. Unterrichts. Ztg.*, 25 (1911), No. 3-4, pp. 229-240).—The author discusses the objects and work of the experiment farm of the Vienna agricultural high school, which is located at Grossenzersdorf, from the standpoint of a complete experimental farm as distinguished from the demonstration fields of the majority of schools.

A thirty-year cycle in agricultural school existence, F. KOZESCHNIK (*Land u. Forstw. Unterrichts. Ztg.*, 25 (1911), No. 3-4, pp. 254-269).—The author gives an account of the beginnings of the farm and viticultural school at Feldsberg, in Lower Austria, as showing the difficulties and requirements of teachers at that time.

The rural continuation school for boys and girls, KERSCHENSTEINER (*Arb. Deut. Landw. Gesell.*, 1910, No. 167, pp. 130-195).—Of the 3 views current for the development of the rural continuation school, viz, (1) that it should continue subjects of instruction given in the public elementary schools, (2) that it should give theoretical instruction in agriculture, and (3) that it should give practical instruction in agricultural subjects particularly adapted to its locality, the author favors the latter and presents reasons therefor. An appendix gives 32 suggestions concerning the organization of rural continuation schools and the assistance of itinerant instructors in their development.

Announcement of farmers' short courses for 1912 at the University Farm, Davis, Cal. (*California Sta. Circ.* 78, pp. 23, figs. 12).

NOTES.

Alabama Canebrake Station.—W. G. Little, of Livingston, has succeeded E. B. Martin as a member of the board of control.

Arizona Station.—Dr. O. C. Bartlett has been appointed assistant state entomologist. A. L. Enger has succeeded F. C. Kelton as assistant engineer.

Arkansas University and Station.—H. E. Truax has been appointed assistant plant pathologist, and has entered upon his duties.

California University and Station.—The new agricultural building was dedicated November 20, with addresses by President Wheeler, ex-Dean Wickson, Dean Hunt, Prof. F. R. Marshall, and others. During the exercises Dr. Hunt was formally installed as dean and director, and a bust of Dr. E. W. Hilgard was presented by the president of the agricultural club, a student organization.

Dr. Le Roy Anderson has been appointed professor of dairy industry, and Harry S. Baird instructor in dairying at Davis.

Connecticut State Station.—W. O. Filley has been appointed state and station forester, vice S. N. Spring, whose resignation has been previously noted; and A. E. Moss has been appointed assistant station forester. R. B. Roe, assistant chemist, resigned October 1 to engage in commercial work.

Connecticut Storrs Station.—Director L. A. Clinton has resigned to accept a position with this Department in charge of the farm management investigations in New York, New Jersey, Pennsylvania, and New England.

Florida University and Station.—A monthly grant has been made by the Florida Citrus Exchange for investigating the changes in the sugar and acid content of citrus fruits. A citrus seminar was held at the station October 8 to 10, with an attendance of about 60, for the discussion of the subjects under investigation.

C. L. Willoughby, formerly of the Georgia Station, has been appointed head of the department of animal husbandry and dairying in the university, and James H. Carpenter has been appointed assistant chemist.

Idaho University and Station.—The division of agronomy has been subdivided into a department of field crops and farm management and a department of soils and soil physics, under the direction respectively of Frank L. Kennard as associate professor of field crops and farm management, and Dr. P. P. Peterson, of the Wisconsin Station, who has been appointed professor of soils and soil physics.

Other appointments include Orlo A. Pratt as assistant in plant pathology in the university and assistant plant pathologist in the station; John C. Kinzer, a graduate of the university, as assistant animal husbandman in the station; Earl C. Hall, a 1912 graduate of the university, as agricultural field agent for Bonner County in cooperation with this Department and with headquarters at Sandpoint; and George B. Caine as agricultural and dairy field agent for Lincoln County, in cooperation with this Department.

Illinois University and Station.—A new \$50,000 glass house for the college and station is now under construction. One portion of it will be used for

horticulture and another for plant breeding and vegetable gardening. The former horticultural greenhouse has been rebuilt for work in agronomy. The central portion of the stock judging pavilion is to be completed in the near future.

A. L. Whiting, who received the degree of Ph. D. from the university in June, has been appointed instructor in soil biology; O. M. Allyn assistant in crop production, vice Arthur Lumbrick, resigned to become manager of an estate; and S. J. Bole instructor in pomology and assistant in plant breeding.

Purdue University.—H. B. Switzer, a 1912 graduate of the college of agriculture, has been appointed assistant in dairy bacteriology.

Iowa College.—The veterinary buildings under construction have been completed at a cost of \$200,000. The group consists of 5 buildings, inclosing an inner court 163 by 106 feet, and contains an administration building, one for pathology and bacteriology, one for physiology and pharmacy, a clinic and hospital building, and an anatomy building. Eventually a sixth building for research and experimental work is to be included.

It is expected that 103 extension short courses will be held in the State during the coming season. New courses have been added in poultry husbandry, bookkeeping, veterinary science, entomology, and concrete construction.

E. F. Ferrin has accepted the assistant professorship of animal husbandry.

Kansas College and Station.—T. J. Headlee has been appointed state entomologist of New Jersey and has been succeeded by G. A. Dean in entomology and Dr. R. K. Nabours in zoology. Other appointments include Edwin C. Johnson, of Minnesota University, as superintendent of farmers' institutes; C. D. Steiner in charge of boys' clubs; G. O. Greene, specialist in horticulture in the extension department; Dr. C. W. McCampbell as assistant professor of animal husbandry and assistant in animal husbandry; E. A. Langworthy in charge of the feeding stuffs inspection; C. M. Vestal assistant in animal husbandry; Dr. Maurice C. Tanquary assistant in entomology; and R. A. Jehle instructor in botany.

Recent resignations include J. N. Flint as assistant professor of animal husbandry, Dr. N. E. Stevens as instructor in botany and assistant plant pathologist, and C. V. Holsinger as horticulturist of the extension department.

Kentucky University and Station.—Recent appointments include the following: In the university, James A. Farra as assistant professor of farm mechanics, R. E. Knapp as assistant professor of bacteriology, Ralph Kenney as instructor in soils, and H. B. Hendricks and J. H. Carmody in extension work, the former in agronomy and the latter in horticulture; and in the station James E. Mastin, James S. McHargue, and G. D. Buckner as assistant chemists, Walter Scheppleman and E. F. Worthington as food inspectors, R. L. Pontius and L. W. McElyea as assistant veterinarians, and W. D. Nickolls and G. C. Routt as assistant animal husbandmen.

Louisiana University.—Elizabeth B. Kelley has been appointed professor of home economics in the extension division.

Maine Station.—Dr. O. A. Johannsen has resigned to become assistant professor of biology in Cornell University.

Maryland College.—The main administration building and the dormitory were destroyed by fire November 29, causing an estimated loss of \$270,000, partially covered by insurance. President R. W. Silvester has resigned on account of ill health and has been appointed president emeritus and librarian. Prof. T. H. Spence has been designated acting president.

Massachusetts College and Station.—The apple packing team won first place in the intercollegiate contest held in Boston, November 8, with New Hampshire second and Vermont third. In the apple judging contest New Hampshire was

first, Massachusetts second, and Vermont third. George R. Pierce has resigned as assistant chemist in the station to accept a commercial position in Cuba, and B. G. Southwick has resigned as secretary to the director to become manager of a farm in Pennsylvania.

Michigan College.—C. E. Newlander has been appointed instructor in dairy manufactures and has entered upon his duties. Joseph C. Bock, instructor in chemistry, has been appointed chemist in the nutrition laboratory of the Carnegie Institution of Washington.

Minnesota University and Station.—During the past summer the university carried out a program of lectures and demonstrations, interspersed with entertainments, over the State, which was divided into three circuits of six accessible centers each. Each circuit received a week's attention, and through the use of six groups of lecturers each center in the circuit had the advantage of the entire week's program. The program included a farmers' day, a town and country day, business men's day, a home welfare day, a public health day, and an art and literature day. The expenses were met by an advance guaranty from each community of \$300.

One feature of the program was the farmer boys' camps, held at most of the centers. The camp leader drilled his boys in farm mechanics, took them to farms and gave them lessons in stock judging, and led them in other ways. The object of this university week was to bring the people of town and country together to receive instruction of a kind "to increase the attractiveness, dignity, and profit of life on the farm and in the town."

Recent appointments include Arthur C. Smith as poultryman; E. W. Major, of the University of California, as associate professor of animal nutrition and assistant dairy husbandman; C. W. Howard, of the Rockefeller Institute, as instructor in entomology and assistant entomologist; Masaji Kugimoto as assistant in animal nutrition; and Mark J. Thompson in charge of the farm at Duluth.

Plans have been approved for a dairy laboratory at the North Central Farm at Grand Rapids. The Cloquet substation is to be maintained on a cooperative basis with this Department.

Missouri University and Station.—A course in rural economics is being offered for the first time in connection with the regular course in agriculture. The work is being given by S. D. Gromer, recently appointed secretary of the university extension service. The first term of the two-year winter course in agriculture opened with an enrollment of 183 students.

The station has begun to issue a series of numbered press bulletins in addition to the press notices previously sent out.

John A. Ferguson, professor of forestry, has accepted a similar position at the Pennsylvania College, this taking effect January 1, 1913. Recent appointments include Ernest C. Pegg as instructor in forestry, and the following assistants in the station: L. B. Burke in animal husbandry, Ray Evans and M. A. R. Kelly in agronomy, William Regan in dairy husbandry, and T. T. Tucker in veterinary science. C. B. Hutchison, assistant professor of agronomy, has been granted a year's leave of absence to take up graduate work at Cornell University.

Nebraska University and Station.—Recent appointments include H. E. Bradford as principal of the school of agriculture, J. R. Cooper, of the Kansas College, as assistant professor of horticulture and assistant horticulturist, Miss Alice M. Loomis, of the Wisconsin University, as professor of home economics, and Miss Anna Olsen as adjunct professor of home economics.

New Hampshire College.—W. R. Wilson, a 1912 graduate of Cornell University, has been appointed instructor in dairying.

New Mexico College and Station.—An entirely new board of regents has been appointed, consisting of J. H. Paxton president, M. O. Llewellyn secretary and treasurer, A. H. Hudspeth, R. R. Larkin, and F. E. Lester, with Governor W. C. MacDonald and Hon. A. N. White, state superintendent of public instruction, as ex-officio members. R. E. Willard has resigned as assistant professor of agronomy to accept a position with the Farm Management Investigations of this Department.

The horticultural and agronomy departments have instituted cooperative experiments in the breeding of onion seed.

Cornell University and Station.—The new department of forestry is offering a full professional course of 5 years, leading to the degree of B. S. at the end of the fourth year and that of M. S. a year later. Work for the Ph. D. degree is also offered, as well as a one-year course in the elements of forestry.

The horticultural library of the late Professor Craig has been donated to the horticultural department of the college of agriculture. The collection includes over 3,000 volumes, being especially rich in the subject of pomology.

Dr. H. J. Webber has accepted a position with the University of California as professor of plant breeding, director of the citrus substation at Riverside, and dean of the proposed school of tropical agriculture. Robert Matheson has been appointed entomologist for the Province of Nova Scotia and professor of zoology at the Nova Scotia Agricultural College.

North Carolina College Station.—Joseph F. Brewster (Ph. D. Berlin, 1912) has been appointed assistant chemist.

Ohio State University.—The new poultry plant was formally opened October 12. The equipment comprises an instruction building and incubator house, a laying house 126 feet long, and a brooder house. At present over 1,000 fowls are being kept. A total of 18 students are registered in the course.

J. H. Gourley, of the extension department, has accepted the position of head of the horticultural department at the New Hampshire College and Station. Recent appointments include Donald J. Kays, a 1912 graduate of the University of Illinois; William Hislop (M. S. Kansas College, 1912), and Gilbert Gusler (Ohio, 1912) as instructors in animal husbandry; R. B. Stolz (Ohio, 1912) as instructor in dairy husbandry; M. C. Sewell as instructor in soils; and Ralph R. Jeffries as assistant in horticulture.

Oklahoma College and Station.—The new college year opened September 2 with an enrollment of over 700 students in regular courses, and this will probably reach 1,200. Many changes in the buildings and the completion of the new engineering building serve to facilitate the work of both the college and station. The department of agronomy is now conveniently housed in its own building, with ample room for soil work, grain judging, and farm machinery studies. The chemical department of the station has moved to the chemistry building, thus bringing all the work in chemistry under one roof. The vaccine and Bermuda grass work of the station have been transferred to the departments of veterinary science and animal husbandry respectively of the college.

Ray Painter has been appointed assistant in entomology.

Oregon College and Station.—M. M. McCool (Ph. D. Cornell, 1912) has been appointed assistant professor of soils and assistant agronomist, E. M. D. Brocker, of Purdue University, instructor in farm management, and W. L. Powers assistant professor of irrigation and drainage and superintendent of the irrigation demonstration farm.

Pennsylvania College and Station.—W. G. Ross has resigned as assistant professor of agronomy to accept the position of superintendent of farms for the Western Penitentiary of the State, and is succeeded by W. H. Darst of the extension department of Ohio State University. Joseph F. Cox (Ohio, 1912)

has succeeded W. W. Reitz as assistant in agriculture. J. D. Harlan, a 1912 graduate of the college, has been appointed assistant in experimental agriculture, E. L. Anthony assistant in dairy husbandry, and David E. Warner assistant in poultry husbandry.

Tennessee University and Station.—About 100 students are enrolled in the agricultural course, constituting the largest attendance thus far registered. A series of 8 short courses of one week's duration, to be held at various points in the State, was begun October 28.

Drainage investigations upon three distinct types of soil in the State to depths of from 1 to 6 feet, and treatment with lime and manure, are being inaugurated. The station and its substation at Jackson are to feed experimentally over 150 steers this winter.

J. E. Toomer, assistant chemist of the station, has resigned and has been succeeded by L. G. Willis of the Pennsylvania Station.

Vermont University.—R. T. Burdick (Cornell 1912) has been appointed instructor in agronomy.

Washington College and Station.—Ten extension schools are to be held this year. Dr. R. Kent Beattie has resigned as professor of botany and bacteriology to accept a position with the Forest Pathological Investigations of this Department.

Wyoming University and Station.—The trustees have authorized the construction of a \$100,000 building to house the agricultural instruction in the university and the laboratories and offices of the station. The building is to be of fire-proof construction, with 3 stories and full basement. The basement will be a laboratory floor for agronomy, entomology, farm mechanics, etc., and will contain an agricultural museum. The main floor will house the offices of the director, animal husbandman, agronomist, and the library. A lecture room will be provided upon the second floor to accommodate 150 students, as well as laboratories for research, chemistry, biology, parasitology, and pathology. The third story will be occupied by the chemical department for instruction and the work of the pure food commission.

Tenth International Congress of Agriculture.—The next meeting of this congress is announced for June 8 to 13, 1913, in connection with the International Exposition at Ghent, Belgium. The congress will be organized into sections of (1) rural economy, (2) the science of agriculture, culture of special crops, and agricultural education, (3) cattle breeding, (4) agricultural engineering, and (5) forestry. Papers should be submitted by January 1, 1913, and may be in French, German, or English and should be accompanied by brief abstracts in French. Mr. Jules Maenhaut, president of the Société Centrale d'Agriculture of Belgium, is president of the executive committee, and Mr. Paul de Vuyst, director-general of the Rural Office, 22 Avenue des Germaines, Brussels, is general secretary.

The third International Congress of the Associations of Agricultural Women will be held at Ghent, June 13 to 15. This congress will be organized into three sections, namely, agricultural women's associations, the professional rôle of agricultural women, and agricultural women in the rôle of the mother and the manager. Mrs. John T. Burns, Lethbridge, Alberta, is representative from North America. Miss Van Aarschot, 38 Rue du Pépin, Brussels, is treasurer and applications for membership should be sent to her.

The second International Congress of Home Training will follow the meetings, on June 15 to 17.

